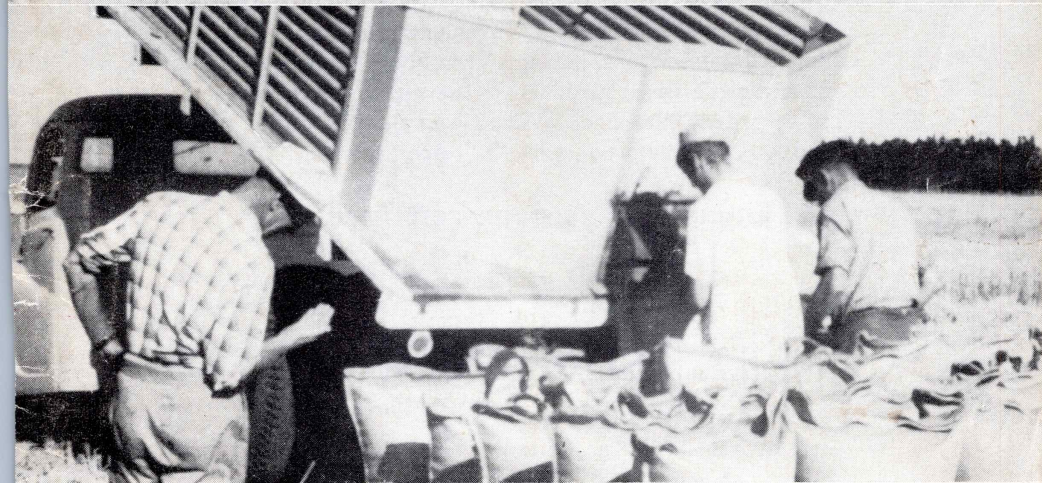


Soil *Hinch* and Health

Organic Farming Issue

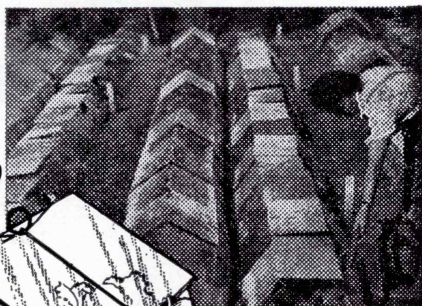
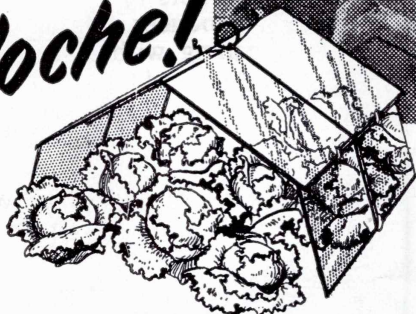


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SOIL & HEALTH JOURNAL

SPECIAL ORGANIC FARMING ISSUE

Vol. 27, No. 5

Twenty-Seventh Year of Publication

Oct./Nov., 1968

ORGANIC FARMING

This issue of SOIL & HEALTH deals solely with Organic farming, that is, a system of farm husbandry, care of the soil and stock, and utilisation of ecological factors to bring about a state of healthy fertile soil, which in turn produces disease-free crops and disease-free animals. It means farming with Nature in the sense that it seeks to develop natural resources in an intelligent way and to utilise those natural processes which make for fertile soil and at the same time yield sufficient return to the farmer while producing health-giving foodstuffs.

The foodstuffs raised on this land are not forced with chemical fertilisers nor sprayed or treated with chemicals or insecticides. The soil life, from the microscopic bacteria to the lowly earthworm do not suffer from the residual effects of insecticides, nor has bird life been adversely affected.

The Organic farmer has no need for forcing agents in the form of chemical fertilisers. By returning crop residues to the soil, by utilising animal manures and by growing deep-rooting plants and herbs he is able to provide stock with needed minerals. By using a herbal ley of mixed species, he can supply the nourishment that stock requires and at the same time obviate excessive pasture damage by pests which occurs in the orthodox white clover-ryegrass mixtures with their shallow-rooting system.

The Organic farmer uses a sub-soiler to break up any "hard pan" and then sows his deep-rooting plants to bring up the needed nutrients and minerals from the sub-soil. He uses the chisel plough so that all humus is kept to the top-soil to where all Organic matter is returned, instead of ploughing it under.

The Organic matter is a valuable material in which plant nutrients such as nitrogen, phosphorous, potassium and other salts are stored. The Organic matter holds these mineral elements in

COVER PICTURE: Harvesting Organically-grown wheat (Arawa) which received two yards of Oamaru Compost per acre when sown in the Autumn and was grown in a drought year when many of the local crops were poor. The average yield for the North Otago district was 45 bushels to the acre, while this crop yielded 73 bushels per acre. A feature was the lack of weeds in the crop. This shows good cultivation practices and weed-free Compost. No poison sprays or insecticides are used and chemical fertilisers have not been used on this farm in the past 27 years.

chelates and as the soil micro-organisms become active by feeding on the Organic matter the growing plants draw upon the elements thus released.

Under the natural conditions pertaining on an Organic farm, the fertility of the soil is dependent upon the activity of these soil micro-organisms and the health of this soil life is dependent entirely upon the food supply available to them—the Organic farmer ensures this by returning to the soil all crop residues, wastes and animal manures.

Organic farmers know that weeds have their place in the pasture and as such are part of the ecological pattern. Weeds are rich in certain elements and many a farmer has found that stock prefer the weeds in the headlands to the pasture in the paddock. The observant farmer can be guided by such stock preferences for certain types of feed.

There are those who claim that hunger and privation would be caused if all poisonous substances were eliminated from farming practice. Some insist that such poisons have their place in agriculture. We are not going to say that the use of poisons is always unnecessary for there may be circumstances where drastic action has to be taken. But we do say, and emphasise, that where human beings are, or food grown, or animals raised for human consumption, every care must be taken. If an alternative method is available—a non-poisonous method—it should be tried first.

This Journal is issued in an attempt to show all those interested and willing to learn that Organic farming is a system of natural nourishment of soil, plants, crops and animals, which in turn produces a state of health which does not need continuing palliative methods to maintain it.

A study of the pages that follow will explain the outline of Organic farming.

JACK D. MEECHIN, Editor.

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SHOWING THE WORLD

How Organic Farming Compares with Orthodox Farming

In this issue we emphasise the importance of Farming **ORGANICALLY** — that is a system of husbandry under which the farmer farms with Nature, wasting no organic matter, returning all animal manures and crop residues to the land and yet refraining from using forcing agents or artificial manures, poison sprays or insecticides.

We feel that in Nature there is a definite place for pests. The late Sir Albert Howard called pests "censors of Nature". Where pests get out of hand Man has upset the ecological balance or the balance of Nature. Pests, and we refer to insect pests, should never be completely eliminated, or the predators, those insects that prey on the pests, will have nothing to feed on. The poison spray enthusiasts aim at a total kill of harmful insects but in trying to achieve this aim they eliminate the predatory insects as well, and as often happens, a few of the harmful insects survive; they have no enemies to attack them and they multiply and do their damage unhindered. Those that survive often build up a partial immunity to the spray. Next the cycle requires stronger sprays or insecticides and from "Silent Spring" we learn of some of the consequences.

In this special Organic Farming issue we present our answer to this ever increasing problem. We give the examples of men farming organically who never use artificial manures, poisonous sprays, or harmful insecticides and yet make as substantial a living from the land as their neighbours, while the productivity of their land is increasing—as is the

health of their stock and crops. In many cases production is equal to, and sometimes higher than that of their neighbours. Yet they have no veterinary accounts and spend no money on sprays, insecticides or artificial manures—there is no need to!

These factors may have to be seen to be believed but they have been well and truly proven both here in New Zealand and overseas.

It is realised that there are those who will attempt to decry the achievements of these Organic Farmers and say "IT CAN'T BE DONE".

For that reason, and to show the whole world that it can be and is being done, a research institute with a difference was set up.

This research institute, or research farms as they are better known, originated some 30 years ago and is still in operation. This is the Haughley

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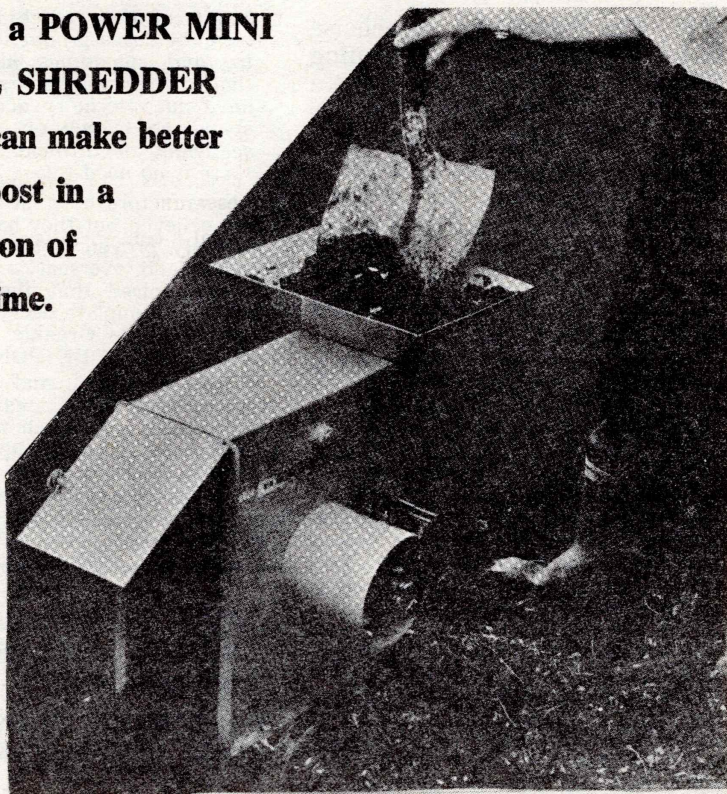
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Research Farms situated at Haughley, Stowmarket, Suffolk, England.

When the idea was first mooted it was agreed that to prove anything on a farm scale, time was essential. It was considered useless to endeavour to prove findings in a short period, or on a small laboratory scale or replicated plot. Accordingly a 216 acre farm was acquired and by private subscriptions only, maintained and financed.

It was intended to find out how under similar farm conditions an organic farm would compare with a mixed farm or a stockless farm. Thus it was that the 216 acre farm was split up into three sections, each with identical conditions.

The first section known as the "Organic" is of 75 acres. Stock is kept on this area, all crop residues and manures are Composted, deep rooting herbs and grasses are used in the pastures, no organic matter is brought in from outside and no artificial manures, poisonous sprays or insecticides are used. Seed is saved from each crop and sown again for the subsequent crop.

The second section (also 75 acres) is known as the "mixed" farm and is run on conventional lines. Here crop residues and animal manures go back to the soil, artificial manures and pesticides are used. There is no Composting done on this area and no deep rooting grasses or herbs, only regular pasture grasses including red and white clover.

The third area is known as the "stockless" area and of course carries no animals but has returned to the soil the residues of crops produced on the area together with artificial manures but of course no animal manures.

These three farms have thus been in operation for a thirty year period so that the findings cannot be said to be fragmentary or due to any unusual set of circumstances.

* * *

The Scientist in charge of the analytical work is a consulting biochemist, Dr R. F. Milton, B.Sc., Ph.D., F.R.I.C., M.I.Biol.

Dealing with soil analysis, Dr Milton has found that the available minerals in the soil vary with the season of the year. Monthly analyses have shown variations in nutrient levels corresponding to the biological activity in the soil. The findings accentuate the need for a **biological** rather than a chemical approach to soil research.

Mineral concentration in crops from both the organic and mixed sections are the same, showing that there is no direct relationship between the application of fertilisers and recovery in crops.

The nitrogen levels show increases in the Organic section. The levels are higher than in the sections where nitrogen fertilisers have been applied.

Every month accurate tests are made of the fields. In one five-year period no less than 25,000 tests were made.

Crop yields on the Organic section have been equal to or better than yields from the Mixed or Stockless areas. In the Organic section the soil fertility is increasing, while on the Stockless it is decreasing.

The Organic samples show the greatest ash analysis, which would indicate superior quality foodstuffs. Greater milk production comes from the cows on the Organic section, while the milk has a higher protein content and higher solids-other-than fat ratio.

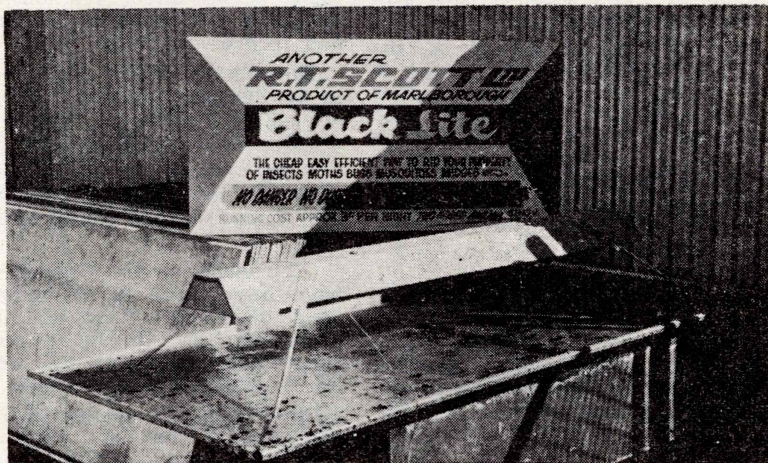
It is significant that on the Mixed section a greater quantity of grass is taken off for silage and hay, with a greater consumption per head of forage. The cows on the Organic section don't have to eat the same quantity of food, and they maintain a better bloom, which is quite noticeable.

The Stockless area shows a steady decline in humus, the soil gradually

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losing texture and becoming harder to work.

The greatest yield of cereals came from both the areas where fertilisers are added. If, however, the cost of the fertilisers is added to the Mixed section, the yield differences did not seem to justify such additions, particularly as the amount removed by the produce (milk and eggs) was not more than a fraction of the N.P.K. applied.

The following is a reasonable summary of the findings at Haughley as issued by the Soil Association:

Organically grown crops go further than chemically grown crops, that is, they will nourish more animals per ton. They also produce more milk per ton.

In successive generations, while chemically grown crops become increasingly dependent on chemicals, Organically grown crops become increasingly self-supporting.

The soil population increases and is more active under the system of Organic husbandry.

Where this biological activity exists, minerals are released to feed crops as required.

Where this activity is depressed by chemicals, this natural release is blocked and minerals get locked up. This can lead to often unrecognized deficiency diseases.

Organically treated soil works more easily than chemically treated soil—i.e. requires less effort in man or horses and less fuel in tractors.

Animals are more contented on Organic food and have a better bloom.

The veterinary surgeon is called in less often for animals bred and fed on an Organic farm.

As the experiment continues, generation by generation, these indications are becoming more, not less, pronounced.

* * *

ORGANIC HUSBANDRY IN HARMONY WITH NATURE

Below we feature excerpts from an address given by Dr R. F. Milton, B.Sc., Ph.D., F.R.I.C., M.I.Biol., when he was describing results of experiments carried out at the Haughley Research farms.

Dr Milton states: I have been in charge of the research work for ten years. During this time I have made many thousands of analyses of soils, crops and foods from the farms.

I have demonstrated that if the soil is kept replenished with humus material from plant and animal residues, then the true fertility of the soil is maintained and increased.

This is because of the harmony which exists with the living organisms of the soil. These organisms keep the soil aerated and drained, and provide a physical environment which is favourable for the establishment of plants of all kinds. They also release the locked up nutrients in the soil and so make them available to the needs of the growing plant.

These nutrients (phosphate, potash, trace minerals) are released only during the warm summer months; after the growing season is finished, all nature, including the soil organisms, becomes quiescent and the supply of available nutrients is thereby stopped. This is a natural cycle and the function of the farmer should be to assist in this natural process.

Disharmony and Imbalance

"We have found that when chemical fertilisers are applied, this natural harmony is disturbed and the soil life is discouraged. As a consequence the flow of available nutrients from those bound in the soil is disturbed, and the plant grown therein must rely upon the chemicals supplied artificially. Thus if one area of a field which has been chemically fertilised for some years receives no such fertiliser for one season, then crop failure results, as can clearly be seen with the naked eye. It follows also that nitrifying bacteria are suppressed, and the land has no opportunity

of building up nitrogen reserve. This reliance on chemical fertilisers causes an imbalance, since only nitrogen, phosphate and potash are applied, whereas the plants' requirements are much more. Thus a relative deficiency of other elements can occur in the plant, resulting in a food which is also deficient in them.

"In view of these facts, it is not surprising that we have found at Haughley that the animals fed off the chemical section are not as healthy as those fed on organic food, and that the cows from the mixed section produce less milk, although they consume up to 25% more in terms of bulk food."

"This increase in milk yield with less fodder is one of the outstanding findings of the experiment, and is of such paramount importance that it must be further and more deeply investigated. It must be concerned with the quality of the food ingested as opposed to the quantity. Our further research therefore will be concerned with the quality in foodstuffs. To this end we intend to embark upon a more intensive research plan which will cover (a) small animal feeding tests (b) the studying of the digestive processes of the cows, (c) the microflora of the rumen, and (d) an investigation into the amino acid components of the proteins in the cereals and produce.

"We have thus increasing evidence that there can be a deficiency in the crops grown on chemical fertilisers, which results in the impairment of the maintenance of the health of the animals which feed thereon; and if on the animal's, then also upon the health of the human beings which feed upon the animals, and also upon the plants grown and nurtured in such a fashion."

"On the organic farm at Haughley, we use no chemical sprays, weed-killers or insecticides in any form whatsoever. On the chemical farm, these are used as recommended by official advisers. Consequently the produce from the mixed farm will

contain residues of the insecticides, etc., which have been applied to the land and the crops. Our object also is to attempt to measure these residues, and to try to ascertain whether they have any bearing upon our observation of the lower health standard and lower milk yield from the mammary glands of the cows fed upon such treated produce.

"We feel that this experiment is vital to humanity in that it provides a link-up with the prevention of disease in human beings. We have to ask ourselves whether the upset in the life-cycle, soil-plant-animal-man-soil, resulting from the use of chemicals in farming is not at least to some extent responsible for the undoubted increase in the so-called diseases of civilisation."

ORGANIC FARMING LEYS

1. They always include deep-rooting species such as chicory, burnet, sweet clover (*Melilotus alba*) and sainfoin, and herbs such as sheep's parsley, ribgrass and kidney vetch, as well as a variety of grasses and clovers (i.e. they are complex, not simple, mixtures).
2. They are usually sown in late summer, with some rye for quick feed and consolidation, instead of under a spring corn crop.
3. They are dressed once or twice with Compost instead of with frequent doses of artificials.
4. They are grazed with as many species of animal as possible, e.g. cattle, sheep and poultry.

Such leys are usually of 4 years' duration. The object throughout their life is to enrich the topsoil, not only with livestock manure and root residues, but with minerals brought up from the subsoil by the deep-rooters, which also help to break it up and improve its structure. As readers will know, the 4-year leys on the Organic section at Haughley have consistently yielded more milk and better animal health than have the conventional leys (also of 4 years) on the Mixed section, though the latter appear much more lush and productive.

The Chisel Plough

The orthodox plough, known as the mouldboard plough, inverts the soil in the furrows. Many organic farmers do not use the mouldboard plough, they prefer the Chisel Plough (illustrated on page 11). Here an organic farmer describes his experiences with the Chisel Plough.—Editor.

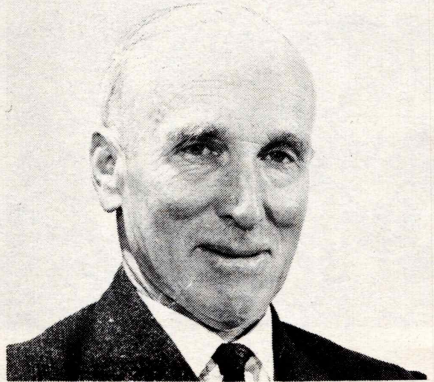


For the past fifteen years I have used the Chisel Plough and I can say that for most farm work this implement is most satisfactory and has proved trouble free and the maintenance costs have proved to be very low.

Except on stubble land all the work on my farm is done with the chisel plough. On stubble, discs are used to break down the straw and then harrows are employed to scatter the straw and make it easier to chisel plough and sow.

To break up a ley I make three or more strokes across the paddock with the chisel plough, then twice more with discs and then a final harrowing gives a good seed bed. An important point here is that it pays to take time between each cultivation as this allows rain, frost and sunshine to assist in reaching the tilth necessary for a seed bed. Also subsequent cultivation assists in destroying weeds that may have germinated.

Since using the chisel plough in potato cultivation I have found that there is a great reduction in the number of green potatoes and the ground is easier to work because all humus is kept in the topsoil.



H. J. LEAMAN, the first farmer to be elected National President of the Compost Society.

After one stroke of the chisel plough on pasture a very great increase in vigour can be seen, and the pasture is more palatable to stock. This appears to be brought about by increased activity in the soil life and results in greater moisture-retaining capacity.

A further advantage of the chisel plough cultivation is that clay is not brought to the surface for the organic matter is kept to the top where it should always be.

I found by experience that in using the chisel plough one of the main things is not to go too deep at the start but to go progressively deeper with each subsequent cut.

It is most important that the last cut with the chisel plough is made on the contour of the land in order to slowly draw any excess moisture.

I would most sincerely recommend all farmers to read "Challenge of Landscape" by P. A. Yeomans. This book enables the reader to gain a fuller understanding of the use of the chisel plough.



HAUGHLEY RESEARCH FARMS —

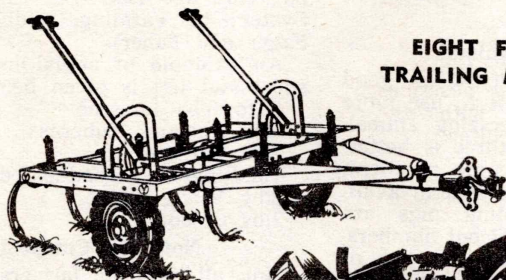
TOP: *Crop of green oats and peas on the Organic section, being cut for silage. This field has received no fertiliser since 1935.*

BELOW: *Part of the Organic section Guernsey dairy herd.*



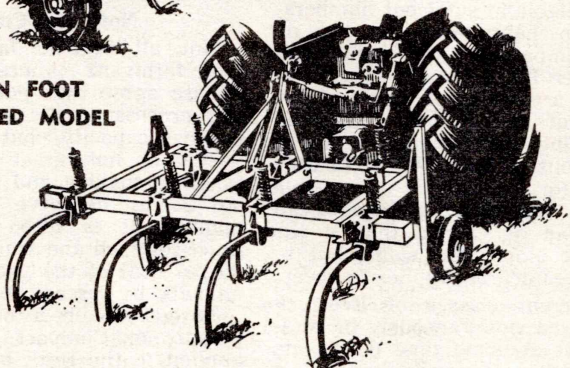
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PRINCIPLES OF ORGANIC FARMING

One of the most important aspects of Organic Farming is balance—a good variety of plants and animals.

Nowhere in Nature is there just one species of animals, plants or soil life. As long as we practise monoculture in farming we will have disease in plants, animals, and man. Many plants do exceedingly well grown in association with each other.

The Grazing Animal

It is an essential part of good organic ley management to use more than one species of grazing animal. Two is the minimum, three is better. Cattle, sheep and horses are excellent, but the last named are seldom available nowadays. Breeding pigs are good if available in sufficient numbers.

Poultry perhaps head the list of grassland improvers and make the ideal partner for the dairy cow, cow dung being a tonic to poultry and the droppings of twenty hens theoretically replacing the minerals removed in 700 gallons of milk. Where poultry are folded (or free ranged in movable houses) on leys, a much larger head of cattle can be carried than if the latter graze alone. The same, but to a slightly less degree, applies to sheep.

The different classes of livestock can be grazed simultaneously or rotationally, but at some time during its four-year life all available species should have grazed the ley, and so given it a good coating of their dung and urine, each with its own special properties. Besides the importance in fertility building of the different grazing habits and manurial values of different species of livestock, each protects the other from parasites and other troubles.

Composition of the Ley

This is very important. The exact mixture and the proportions of its different ingredients must, of course, vary according to the district, but should always contain a wide range of suitable grasses and clovers, together with deep-rooting plants such

This is based on articles by Lady Eve Balfour in "Mother Earth", the Journal of the Soil Association.

as chicory, burnet, yarrow, American sweet clover, lucerne, kidney vetch, ribgrass, etc. All such mixtures are adaptations of the Clifton Park Mixtures devised by Robert Elliott over 50 years ago (see the "Clifton Park System of Farming," published by Faber and Faber).

An example of actual mixtures in successful use is given below:

6 to 8lbs Lucerne
2lbs Phalaris Tuberosa
2lbs Timothy
1lb Ribgrass (broad-leaved Plantain)
2lbs White Clover
2lbs Chicory

Note on Compost

Not all organic farmers compost their farmyard manure, but those that do are agree that putting it through this process greatly increases its productive capacity, but whether composted or not, great care should be taken in making and handling F.Y.M. so as to conserve all the liquid manure. It is often forgotten that practically all the trace minerals and 90 per cent of the potash ingested by animals is passed out in the urine.

To get the best out of farmyard manure or Compost it should when applied to the land, be kept near the surface, never buried deeply. In the case of Compost, it is best only harrowed in or even used as a top-dressing.

Livestock Management

The organic farmer applies the same principles to the care of his livestock as he does to the care of his soil population. The keynote is natural nurture through live, virile food. The basis of diet for his cattle, for example, will be grazing in the summer, and high-quality hay and silage in the winter, for Nature intended the cow as a converter of coarse fodder and has provided her with four stomachs for the purpose.

Grain feeding will be moderate and

will be home-grown and fresh-ground, for feeding large quantities of processed concentrates results in a derangement of the animal's metabolism with resultant loss of stamina, revealing itself in loss of fertility or susceptibility to mastitis and other complaints, for even bacterial infection can only take place when some prior breakdown has occurred in the resistance mechanism of the host. Faulty nutrition is the commonest cause of such breakdown. Mineral supplements, where required, will be given in the form of dried seaweed, for there is all the difference in the world between natural vitamins and minerals built into the organic structure of a plant, and their synthetic chemical substitutes.

An animal's utilisation of its food is dependent on the health of the micro-organisms living in the digestive tract. They can be suppressed by wrong feeding as easily as their brothers in the soil. It is often forgotten that micro-organisms play a far greater role in the promotion of health than they do in the production of disease. So biological balance, even inside the animal, is important.

Results of Organic Farming

This is the verdict of organic farmers themselves, as reported to the Soil Association from many parts of the world.

(1) *High yielding, disease resisting crops that require no poison sprays or pesticides for their protection.*

(2) *Greatly increased health, a longer productive life, and negligible mortality in all livestock, without recourse to drugs, antibiotics or sera.*

(3) *A 10% to 15% reduction in the quantity of food required to produce the same output of animal products.*

To sum up, health, whether in crops or livestock, results from the application of Nature's own fundamental nutrition principles.

That organic farming is not only successful but also profitable, can be deduced from the fact that we have no record of any farmer, once having made the change, ever going back to the old methods!

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The Deep-rooting Herbal Lea

*"Live as if you'll die tomorrow,
Farm as if you'll live forever".*

—English Proverb.

Here, on this farm, we are strictly organic as taught by Sir Albert Howard. And here's how things have gone since we came here in 1946.

For some years we didn't make much progress, and the pastures looked starved in spite of all we did to build up humus. Our 600 acres had been heavily cash-cropped year after year, with the result the ground was like a pavement in summer and very mushy after rains. We got on to deep rooting species, à la Newman Turner; lucerne, American sweet clover, chicory, burnet, sheep's parsley, etc. Our sheep soon ate out some of these, so now we are down to our today's pasture—lucerne 8lbs, phalaris tuberosa 2lbs, chicory and timothy 3lbs each, plus yarrow, the usual clovers and additionally, dandelion and plantain; all good food, health promoters, and drought resisters. Also they survive grass grub and porina attacks. But still we did not get the growth we had expected.

Rather in desperation I re-read Sir Albert Howard's chapter on "diseases of the soil" in his "Agricultural Testament". Could it be possible with our hard dry summers, and frequently equally hard winters that our land just might have the "Alkali Condition" which he describes so vividly—impermeability of the soil being the predisposing cause. I now quote Howard: "The theory of the reclamation of Alkali land is very simple. All that is needed, after treating the soil with sufficient gypsum (which transforms the sodium clays into calcium clays) is to wash out the soluble salts, to add organic matter, and then to farm the land properly."

What was GYPSUM? Calcium Sulphate (refer to list of organic fertilisers).

Where can we get some? It's imported for cement making.

So with much to-do we eventually got a load from the Golden Bay Cement Co., Nelson, and had it finely ground by our local lime works. We spread it doing half of two 15-acre paddocks.

I very much regret not having a photo of the tremendous result we got on the two treated half paddocks. Almost unbelievable, and that was without irrigation to wash out any salts.

Now Howard loathed chemical fertilisers, but it seems gypsum is not a plant food, it is a soil conditioner; or anyway that is as I see it. Incidentally, gypsum is forming naturally in the ponds of our nearly salt works.

We have treated about 160 acres a year with two cwt. per acre of very finely ground gypsum, and hope it is what Howard meant by "sufficient gypsum". Incidentally we have since tried factory-made calcium sulphate, called gypsum by the factory, but got very little response from this, nor from straight sulphur either. So we stick to the naturally formed gypsum, which costs us about \$36.00 per ton by the time we have spread it.

Gypsum is 98% calcium sulphate; I've yet to learn what the remaining 2% consists of. Golden Bay weren't sure. It could be that factory gypsum lacks this 2% of unknown content.

Now in summer our paddocks pack less tightly, and in the wet the improved soil structure does not go to mush. And briefly; we have no mouldboard plough. We use chisel plough, grubber, and tyne harrows, and on stubbles,

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discs. We make as much hay as we can. Some years up to 10,000 bales.

GRASS GRUB AND PORINA

These two pests operate here and we do lose some grazing as a result. But we do not get the total ruination of the pasture which supered ryegrass and white clover so often suffers. After such an attack the infested area looks pretty groggy, with each plant isolated by some inches from its neighbour. But with the oncome of early autumn rains, the deep rooters pick up. They have not been killed. The bared places start to fill in with volunteer clovers, herbs, weeds, etc., so that by the start of winter the effects of the attack are very much less noticeable.

These pests can be particularly destructive with a newly sown out pasture.

THREE-EWE COUNTRY

To overcome this we now sow our pastures during the time these two are dormant, i.e., autumn. We try to have the new pasture well up before the frost lift. But, because with our dry summers it's usually too dry to work up and germinate weed seeds, our new pastures usually look pretty hopeless in their first year.

But the point is that by spring our deep rooters have such a start that they can withstand grub and porina. Then in its second season, from our experience, the deep rooters seem to dominate the weeds until, almost to one's surprise we have the first class, largely weed-free pasture which we had aimed to get.

BLACK LIGHT TRAP

We got on to the ultra-violet light trap this year too late to do much about it, as the flight of brown beetle and porina was nearly over. We did, however, on warm nights get some very heavy trappings. The strip of black light is supported over a 6' 0" x 3' 0" tray with a two-inch deep lip all round. About an inch of water in the tray is covered by a cupful of kerosene.

There is no doubt this can wipe out thousands of moths and brown

beetles in one night. On several occasions there would be a quart jug full of dead pests to be cleaned out of the tray by morning. There will be a great deal of interest in this black light trap when the flights of moth and beetle start next spring. Also we are particularly keen to find out whether this may, at long last, be the answer to the codlin moth.

Although this black light trap is now only just coming into use here, it is well known and largely used overseas, particularly in the United States for cotton protection.

One question is, can we trap these pests before they scatter their eggs? Literature from the U.S.A. merely claims that a considerable reduction in the spraying programme can be effected.

The other is, are we also trapping the goodies? i.e., the predators of the porina, grass grub and codlin. This will need watching.

In this 22-inch rainfall country with hot dry nor'-westers, and no irrigation, it is usually considered three-ewe country. When we came—1200 sheep and about 60 acres in wheat. Today (and I realise our increase is far from startling in comparison with results which are regularly reported by the use of super) we have up to 30 acres of wheat going about 40 bushels; 1400 half-bred ewes; 320 ewe hoggets (which go to the ram each year and need more than equivalent ewe care), plus rams and killers, etc., in all about 1,800 sheep. Lambing is high, our ewes seem very fertile, and for fear of being accused of exaggeration I'll leave it at that. The ewe hoggets give us a good 80 per cent lambing.

This year we have 120 beef steer calves bought in, and we may buy more as we have had most favourable rains. These calves are usually sold off prime, 12 months later.

Finally, we don't know whether or not we had an alkali soil condition, but we do know that gypsum suits our land. We shall carry on with gypsum until we fail to get a response. As could be expected, disease of any kind is almost unknown here.

—Cobden Farm, Seddon, Marlborough.

**T. A. D. Wilson,
Ashburton**

Rotary hoe useful farm implement

It was in 1938 that I first became interested in Organic farming. I noticed the difference between the soil and crops in the vegetable garden and that of the farm itself. Also about that time I read a remarkable book in which a scientist produced the thesis on the decline and fall of the ancient civilisations and included in his theory that the basic cause was ignorance of conservation plus "mining" of the soil, the once fertile top-soil, and destruction of the natural forests, resulting in loss of rainfall and the final disappearance of surface streams and the lowering of the underground water table. Results—sand and sadness and later desolation.

After much thought and further study I concluded that this scientist was right and this gave me such a mental jolt that I asked myself "what was I—or other farmers—doing to conserve our heritage" and the answer was "nothing".

Looking at my paddocks with a "new eye" I noticed that our soil was "whiter" and less friable than it was in the vegetable garden, where stable and cow manure had been applied for generations. Also surplus vegetables and roughage had always been dug in with rotted hay, etc. There was also twice the depth of soil in the garden than in the paddocks. Proof enough, yes, but how to apply it on a farm scale? I could at least try returning the straw and crop residue instead of burning it (as many still do).

By a stroke of good fortune a contractor appeared in the district with a tractor-mounted rotary hoe. He charged twelve and sixpence per acre per stroke and he appeared to get very little business. The neighbours were sceptical when I tried out the machine to work in headed barley straw in one paddock (which, by the way, later yielded nearly 90 bushels of barley

to the acre) after he had given the paddock but one stroke. I had the contractor take up a small paddock grass with three strokes and this yielded 84 bushels of partridge peas per acre.

This convinced me that this machine was the answer to working in straw. I had already noticed that straw rotted very quickly when near the surface as opposed to ploughing it under where decomposition is retarded through lack of action by aerobic bacteria and any benefit is doubtful.

The outbreak of war in 1939 interfered with my plans and it was not until 1945 that I was able to procure a suitable hoe which gave good service for some years until replaced by a similar though later model which I used until I retired five years ago.

Anyone may ask "how can land be improved while taking several crops in succession even if the crop residues are returned to the topsoil?" I am sure that the answer is that a very large proportion of the requirements of the plant are taken from the atmosphere, dew and rain, so that on balance more is returned to the soil when the residue goes back (some five tons to the acre of dry matter) than when the crop is taken out. This was proved by a neighbour who saw my results in my earlier years. He grew several crops of barley in succession while returning the residue every time, and on the average the yields increased every year. This was only a small paddock but was, in my opinion, a most valuable experiment.

I believe in the rotation of crops, also alternating every few years with sheep. I have found a good rotation is peas out of grass, followed by wheat, then barley, then back to grass and clover sown down on top of the drilled barley within two days of

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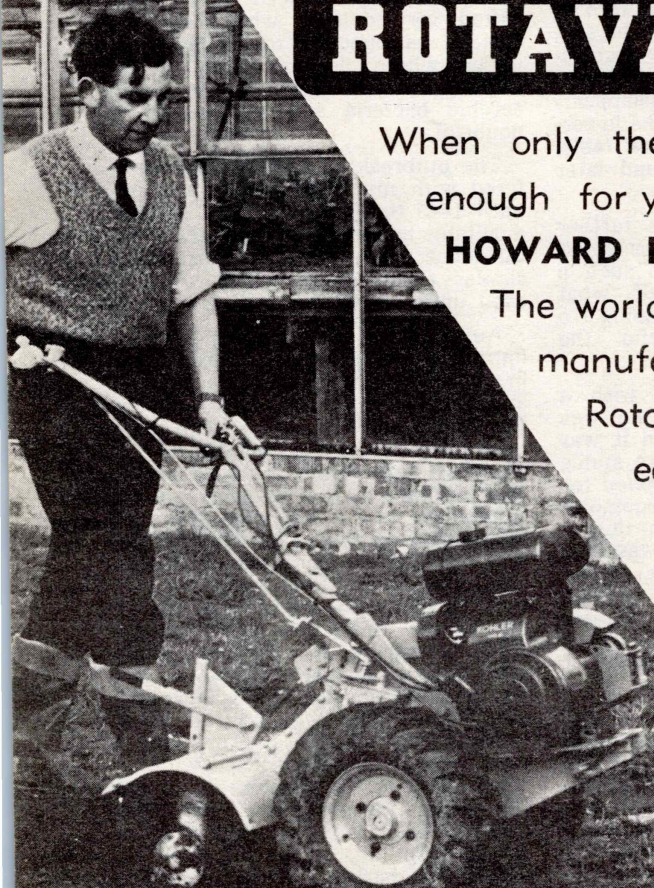
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drilling in the grain. This is, of course, spring sowing of pasture which favours the clover, most valuable to the soil by the action of nitrogen fixation from the air. Pea straw is the best of the straws for soil building purposes (as many commercial and home gardeners have found out) followed by barley and wheat in that order but all residues plus stock droppings and urine are the keystones of the "Law of Return" as in Organic farming.

Finally a few tips. The disk drill is the answer against straw clogging up coulters as with the standard drill. Turn all available stock on to the straw as soon as "bags away" as the urine and droppings assist decomposition of the straw and the stock trample it down.

I have managed without chemical fertilisers and poisonous insecticides including DDT and found that good yields have followed my soil-building programme for Nature the "great architect" knows best.

**P. Rowe,
Taranaki**

Effects of facial eczema minimised

During a recent epidemic of facial eczema when some farmers had as many as 75 per cent of their herds out, an Organic farmer, Mr P. Rowe of "Golden Vale" RD2, New Plymouth, had only four of his herd affected. At the time his herd comprised 70 milkers, 20 heifers and 40 yearling calves with a T.B. clearance.

On this farm he also runs brood mares, ponies and poultry (free range laying stock).

The farm comprises some 80 acres, 65 of which are in grass, the remainder gully and some sheltered native bush. The electric fence is used for strip grazing and for rotation of paddocks. Weeds such as gorse, blackberry and woolly nightshade thrive and are gradually being eliminated without the use of sprays. The soil is rich free-draining loam.

In order to maintain the health of his stock and ensure the continued fertility of his soil, Mr Rowe has instituted a scheme whereby all manure from the milking sheds is conserved and incorporated into large Compost heaps, along with fowl manure, sawdust, seaweed, green weeds, bracken, fern, etc.

Hay is bought in and is fed out on gullies and sidlings. Dry stock

are wintered and summer grazed on 25 acres of run-off. The water supply is excellent being from clear spring water and adequate for all purposes.

The locality is very exposed to west and south winds, and to offset this some 2,000 barberry hedge plants were planted last winter. Around the home orchard evergreen poplar, phebalium and bamboo have been planted for shelter. This has already brought about an improvement in crops raised within these areas.

A start has been made with the commercial production of vegetables and the following are grown: Fruit—cape gooseberries, grapes, guavas, Chinese gooseberries, 8 var. plums, 8 var. peaches and pears, 10 var. apples, 15 dwarf apples, 2 var. nectarines, and several kinds of oranges, grape fruit, lemons and mandarines. Vegetables—parsley, celery, cucumber, radish, pigeon peas, blue peas, parsnip, broad beans, dwarf beans, 4 var. kale, leeks, asparagus, sage, capsicum, chives, kumara, soya beans, potatoes, yams, marrows, pumpkin, and green peas.

This large selection of fruit and vegetables go a long way to feed the large family of 8 children, and not one of them has seen a doctor since they were born, truly a record in every sense of the word.



It's only natural!

Curiosity has been responsible for all sorts of discoveries. The schoolboy reads the notice "Do not touch"—and an imp inside him tells him to try—to see what will happen!

In the case of farming and gardening the facts are simple, for all goodness taken out of the soil must be replaced.

There is nothing curious about the goodness that OAMARU COMPOST gives to the soil—for OAMARU COMPOST is the Organic fertiliser that supplies the very foods, macro and micro-elements that the growing plants need in an effective—yet economical form.

Many testimonials received reveal the evident satisfaction gained by using this soil fertility-building medium. YOU TOO can ease your crop worries by regular use of OAMARU COMPOST and gain greater yields as many farmers have done.

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Organic Grassland Management in New Zealand

I interpret land development as a challenge to man, and I am following a system of organic farming

Since my land is too hilly to permit the making and spreading of heap Compost, my aims are to Compost the grass through the sheep, which then deposit it on those pastures needing development, and at the same time to boost underdeveloped pastures.

Ranui is a farm of 720 acres, purchased in 1949. It is situated 65 miles north of Wellington. Our annual rainfall is approximately 40 to 42 inches, over half of which falls during two winter months, June and July; January and February are almost without rain.

The farm comprises two different soil types. On the front section—about half the farm—the soils are of sandstone origin and of low natural fertility. The back section soils are of mudstone origin (papa). At the time of taking over, it carried a hill-country sward of browntop, danthonia† and crested dogtail, with only a small proportion of the better grasses. Most of the country was strongly invaded by manuka scrub.

Stock then carried was 800 breeding ewes, 20 Romney rams, 50 Aberdeen Angus cattle and a bull. This year my winter carrying capacity will be 1495 breeding ewes, 34 Romney rams, 650 ewe hoggets (under one year) and 70 weaner steers. During the summer all wether (castrated male) lambs are fattened on grass and crops, and normally a further 400 to 500 wether lambs are bought in and fattened in the autumn with a small carry-over to the spring. Cattle are purchased to utilise surplus growth and their numbers are never static—usually 120 to 150 are wintered.

†Browntop is an *Agrostis* species, now much used for sowing lawns. *Danthonia* is a close-growing native grass.

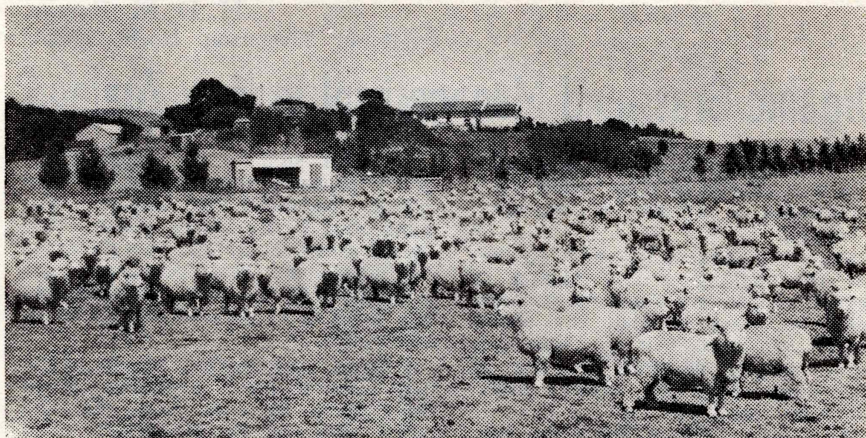
My first step in the development of the property was to subdivide the existing paddocks into smaller units, using good 8-wire fences, and to erect the necessary buildings. This policy of subdivision has been continued year by year until the front paddock has now become 15 paddocks of 15 to 20 acres each.

I have now started breaking the back section into 9 paddocks of approximately 50 acres each, the size being governed by topography. The fencing used here is a new type of electric fence which is much more economic than the conventional 8 wires. The fences are powered by a unit with high pulse rate, batteries being maintained at full charge by a windcharger situated in the hills. Up to 11 miles of fence can be powered by one unit.

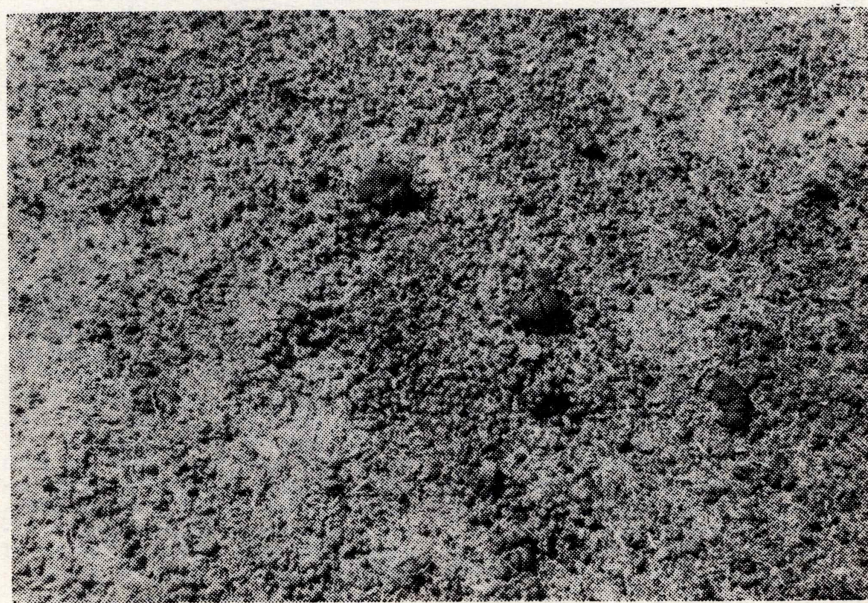
Subdivision of the front country incorporated the separation of ploughable from unploughable country. I ploughed and giant-disked a new paddock each year and sowed 2lbs of chou moellier* and $\frac{3}{4}$ lb swedes, to be used as winter feed for the hoggets, which also had access to an adjacent unploughable paddock as run-off. The run-off benefitted by the addition of some humus and in addition helped to ration the crop. After feeding-off, the paddock was summer-fallowed and sown to grass the following autumn, with 38lb per acre of a mixture of clovers, perennial ryegrass and cocksfoot of the best strains available. In this way 20 to 25 acres of new grass were sown each year. As time has progressed and flock numbers increased I have grown summer fattening crops of rape or soft turnips following the chou moellier, instead of fallowing before sowing to grass.

As soon as there were sufficient paddocks for the purpose, I commenced rotational grazing

*Marrow-stemmed Kale.



Heavy stocking on the camping paddock after the sheep have been feeding off good pasture for a two hour period.



Ranui. Close-up of sheep manure on paddock after removal of sheep. 1,300 sheep on $3\frac{1}{2}$ acres. Time taken, 3 weeks.

throughout the year. This involved running all my ewes in one paddock with a daily shift to a fresh paddock. Under this system I was able to build up the soil fertility and keep the farm evenly grazed. This method, I found, had a twofold advantage: firstly, the stock were kept in a very healthy state; and secondly, the pastures developed a very rich colour and the better species of grasses were encouraged.

In the early stages I used about 20 tons annually of either basic slag, which I think is the most beneficial of all, or superphosphate. This was spread over newly-sown pastures at the rate of $2\frac{1}{2}$ cwt per acre to give them a boost. Three years ago this practice was dropped, and I can see no noticeable depreciation in the pastures. The only artificial manure used now on the property is 2cwt super per acre when sowing a crop, to give it a sound "kick-off".

Rotational Grazing — Sheet Composting

Three years ago I commenced an entirely new system to develop unploughable paddocks. Starting at weaning time in December, I placed all the ewe flock in the one paddock, which was in poor heart but had at least 3 good pastures adjacent to it.

After a series of experiments it was discovered that at that time of the year (summer), once the ewes had learnt to eat vigorously, two hours on good pasture per day maintained the flock in good condition. From then on they were fed on good pasture 2 hours daily and then returned to the camping paddock to deposit dung and urine and build fertility. So you see why I call the system "Rotational Grazing".

One feeding paddock generally lasts 1,700 ewes about a fortnight, after which the second and then the third are fed off. By the time they reach the third it has usually gone to seed, so the sheep are oversowing the camp paddock in a most economical and efficient manner, at no cost. I am convinced, however, that in future it would be well worth my while apply-

ing a dressing of about 25lb per acre of new seed of fresh varieties of grasses to give the stock a more balanced diet. I intend to concentrate on deep-rooting species.

The camp paddock should not be too large if full benefit is to be obtained from this system. The most efficient would be 15 acres for 1,200 ewes. After 3 months' treatment the increase in food value in one year is from $1\frac{1}{2}$ sheep per acre to at least 4 sheep under my conditions.

After completing development of this one paddock I continue the system round the farm, treating the paddocks in pairs until lambing time, when I revert to the rotational system again. First of all the ewes are camped in paddock A and fed 2 hours daily from paddock B. This usually lasts 1,400 ewes for 2 weeks. After this the ewes are moved to paddock C and fed on paddock D, and so on round the farm. On the second time round, instead of camping in paddock A, they are camped in paddock B and fed off paddock A, thus evenly manuring the whole farm.

The results have to be seen to be believed. I summarise them thus:

(a) The colour and general vigour of the pastures show an obvious improvement.

(b) The depth and texture of topsoil has increased beyond all dreams.

(c) The earthworm population has established most vigorously, and I presume bacteria must be working actively in the soil.

(d) The better species of grasses are becoming established, and moss and less nutritive varieties are being forced out.

(e) The stock are doing exceedingly well through better quality pastures and are comparatively free from the parasites and diseases which cause considerable trouble in neighbouring flocks. My lambs have not needed any medicines for the last 4 years and are really doing well.

((f) The system is financially sound in that the money used by the average farmer for artificial manures and their application (no mean item) I am able to put to other more profitable uses.

(next page please)

With the exerted pressure by the chemical companies, with their "Kill that Parasite" approach of their scientists, we of the farming world are gradually being advised against the actions of Nature.

Surely it is high time some authority was set up to investigate WHY we are suffering the parasites and diseases of the moment, instead of producing drugs to kill them.

As a result, many of these drugs are most harmful to humans, whereas they appear to only prune, or partially eradicate the complaint.

For instance, the grass grub: We are told one application of DDT will give a paddock 3 to 4 years' immunity but it is found it is still necessary to apply DDT every year, and the more often we apply it the more immune the grub seems to get.

I am convinced that grass grubs may be found in all pasture lands, but with the application of superphosphate, which encourages the grass roots to grow nearer the surface, the grub is enabled to do more damage to the crop itself.

On Ranui I have one or two places where the effects are most noticeable. Upon investigating the areas, I was interested to see that the soils had an extremely sandy structure which would not hold together—as though there was some trace element or humus deficiency.

This year I have spread decayed hay over the areas and so far there has been no evidence of the grass lifting, though the grubs are still there. It is really a bit early to really test the experiment, but I am certain there must be some approach other than DDT.

I would like to see a survey done on farms that are affected with grass grub and this compared with a survey of farms which are not.

- (a) Their systems of farming.
- (b) Stocking rates.
- (c) Type of pasture.

Surely there must be some reason why one farm is troubled with grass grub and another alongside is not, which is so often the case.

On Ranui I have also used Municipal Compost on two paddocks extensively and am convinced there are great possibilities in its use. My source of supply is the Masterton Borough Council's depot. The market price is £3 per ton and the application rate (alternate years only) is:

5 cwt. per acre 1st year.

4 cwt. per acre 3rd year.

3 cwt. per acre 5th year.

2 cwt. per acre 7th year.

[A higher rate of application is recommended, depending on the fertility or otherwise of the paddock. Often the first application is 10 tons per acre; subsequent dressings can be applied after 4-5 years, when a lesser quantity is needed.—Editor.]

Very little benefit is noticed for about 5 years, as far as the stock is concerned, but from then on stock thrive remarkably well and fatten very easily. It is quite impressive to notice how rarely one would find a scouring hogget in the paddock. The grass also will withstand drought conditions considerably longer than any other paddock.

I am perfectly satisfied there is a very great future for this type of material.

* * *

Mr H. M. Barton reports an excellent season with plenty of feed and stock very healthy, the lambs doing especially well on a paddock sown down with a mixture containing chicory, burnet and sheep's parsley. He also reports that he could not find a single caterpillar of the white butterfly on his crop of chou moellier (marrow-stem Kale), though his neighbour's crop alongside was half-eaten by the pest. Both paddocks were sown with the same variety at the same time, the only difference being that Mr Barton's had only 1cwt per acre of serpentine super, while his neighbour's had 3½ to 4cwt.

A LETTER

from

The Director-General
of Forests



As the population of New Zealand grows and our standard of living rises it will become increasingly necessary for us to make the best use of each acre of our land.

Because of the generally rolling or broken nature of much of our country there are few farms that have not a wasted acre or two in scrub, gorse, or other aggressive weed. These acres could be growing trees, which will not only make for better balanced land use, but will give the farmer another source of income.

Most parts of New Zealand are buffeted either by strong cold winds or strong dry winds or both at different times of the year. Well placed shelter is therefore very desirable on farms, orchards and intensively cultivated areas.

Apart from their practical value, the trees add beauty and a completeness to the landscape which though not easily defined is instinctively recognised.

If care is taken to choose the right species, some of these trees grown primarily for shade and beauty, can produce valuable decorative timber.

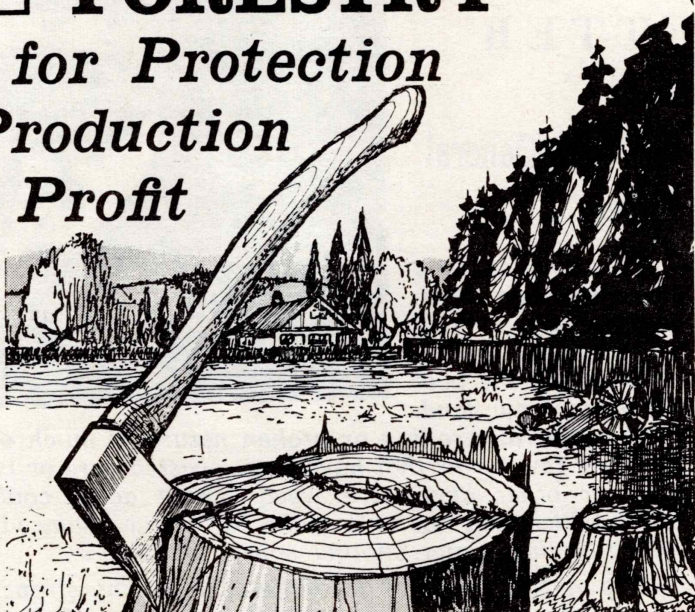
Like any other form of land use tree growing must be carefully planned and advice on the many aspects that need to be considered can be obtained throughout New Zealand from Forest Service officers.

Farm forestry can be profitable and gives those who practise it well, a real sense of achievement. Through it can come a very worthwhile contribution to our timber needs.

—A. L. Poole

FARM FORESTRY

*for Protection
Production
Profit*



SUCCESSFUL farming is becoming more and more dependent on the efficient utilisation of all available land. The intelligent farming of woodlots plays an important role in wise land use and, incidentally, makes more effective use of farm labour.

Woodlots provide a source of timber, fencing materials and other forest produce required on a farm; they are a valuable crop on what may otherwise be unfarmable land; they increase stock and crop production by the shelter they provide, act as a preventative and a cure for erosion, and improve the appearance of farm.

The objective of farm forestry is to make better use of hard-to-farm areas by turning them over to woodlots, and to increase the productivity of good soils by the provision of adequate shelter and shade.

"The New Zealand Forest Service will assist with advice on establishing a woodlot and has loan finance available to suitable applicants."

**Farm Forestry —
part of wise land use**

Issued by the New Zealand Forest Service



1230

Farming for Health

About 1948 we gave up sowing simple perennial ryegrass and white clover mixtures with its orthodox management.

During the autumn, we now sow a proportion of paddocks in a standard special purpose pasture as follows:

Italian ryegrass 10lbs, H1. 20lbs, Timothy 2lbs, Cocksfoot 2lbs, Montgomery red clover 2lbs, Cow grass (a red clover) 2lbs, White clover 1lb.

The following spring, the pasture is shut up as if for hay. When the red clover is in flower about 15th December, freshly weaned lambs are stocked at twenty or more per acre.

By having a series of paddocks and never letting the grass get really short for any length of time, a mulch of decaying vegetation is formed. Not only does this mulch greatly increase soil life, but it exerts a stabilising influence on both temperatures and moisture in the soil. Wind velocity, which has such a rapid drying effect on hard grazed pastures in summer, is greatly reduced.

With the long spelling of pastures between grazings it appears a greatly increased soil life is propagated. Some evidence in the autumn is seen by the mass of connected sheet cobweb glittering in the sunlight and easily seen when the sun is low in the horizon. Hard grazed pasture will only have the occasional web.

Many people on seeing the great bulk of plants covering the soil, express surprise at the apparent waste, they think a pasture should be kept eaten off close to the ground, overlooking the fact that root development is governed by leaf development—the height of the leaf above the ground is controlled by depth of root below the soil surface.

We believe, that if the availability of plant food is to be improved the

Farming Organically—or Farm-for Health, is the method of Agriculture whereby the farmer does not use chemical fertilisers, poison sprays or insecticides, but includes in the pastures a mixture of various species of grasses and clovers and deep-rooting herbs also. The aim is to provide animal feed, rich in minerals and vitamins so often lacking in lush looking pastures comprised largely of shallow-rooting grasses grown on topsoil from which the minerals have either been leached out, are lacking, or in unavailable form. The deep-rooting herbs tap the subsoil for minerals and trace elements and in times of drought are able to withstand the dry conditions. Apart from supplying a balanced pasture, rich in the essential nutrients, mixtures such as these do not suffer from the infestations of grass grub and porina so troublesome in the orthodox ryegrass-clover mixtures.

soil population must be fed and housed adequately. This means soil aeration—getting the oxygen into the soil.

It is apparent that summer growth was intended for this very purpose as well as that of reproduction.

When pastures are kept grazed down to an inch or two throughout summer, this object is frustrated. The surface temperature of the nearly bare soil frequently reaches 120 deg. F, whereas, under a mulch of decaying vegetation, the temperature is about 80 deg. F, about normal atmospheric summer temperature for the Manawatu. The optimum temperature for the growth of grass is 65 to 70 deg. F and the critical minimum 45 to 46 deg. F.



The author is shown here standing in a Special Purpose Pasture containing red clover and chicory, both in flower. This is typical of pasture during February when lambs are grazing.

When grassland becomes scorched and dry the soil life under it must be completely unbalanced. Is it any wonder that such diseases as facial eczema and salmonella occur?

In more recent years the special purpose pasture previously mentioned has been supplemented by two more. The first of these based on Newman Turner's recommendations is suited to heavy soils and especially dry peaty soils.

It is made up as follows (all in pounds per acre):

Cocksfoot (N.Z. Grassland leafy) 6, Timothy 2, H1 3 (short rotation N.Z.), Phalaris Tuberosa 6, ribgrass (long leaved plantain) 1, Montgomery red clover 2, cowgrass 2, white clover 1, chicory 3, yarrow $\frac{1}{4}$.

In devising this mixture we had in mind the fact that no one plant provides a satisfactory diet all the year round, nor does either the immature or the very mature stage of any grass.

Continuous feeding of a simple pasture mixture may well be adequate for two months of a particular season of the year, but stock relish early and late maturing plants at

The writer of this article, R. A. Buchanan, of Lockwood, Kairanga, R.D. 5, Palmerston North, is a breeder of stud sheep (Romney breed) and together with his father, farms an area of 264 acres. The stud was first registered in 1929.

particular stages of growth and when given free choice they graze a wide variety of plants at various stages of maturity.

Over a 4 to 5 year period the 20/80 nutritive ratio (protein/carbohydrate) is better maintained in this complex mixture.

Vitamin, plant hormone, and mineral requirements are also met and the variety of plant species should assure a sufficiency of antibiotic substances so important for combating infection and disease.

There is an abundance of earthworms, about 60 per cubic foot of soil, particularly during the autumn or early winter when increasing soil moisture helps the decaying process. Under hard grazing during dry summers, few worms are found and

these are tied in knots, the very hard dry soil preventing freedom of movement.

It is known that the vitamins work best in combination with each other. If one occasionally allows a pasture to go to seed the greater leaf surface traps more energy from sunlight thus providing many vitamins.

The biological balance seems to be better maintained because the decaying vegetation from such a pasture gives more active growth throughout the year.

A strong stream of life energy is not broken at any point of time. The so called healing herbs, chicory, plantain, yarrow etc., have a strong aroma. The blue flowers of the chicory and the white flowers of yarrow as well as attracting butterflies, bees etc. may be, with each plant's scent, important in directing the animals to getting a better balanced diet.

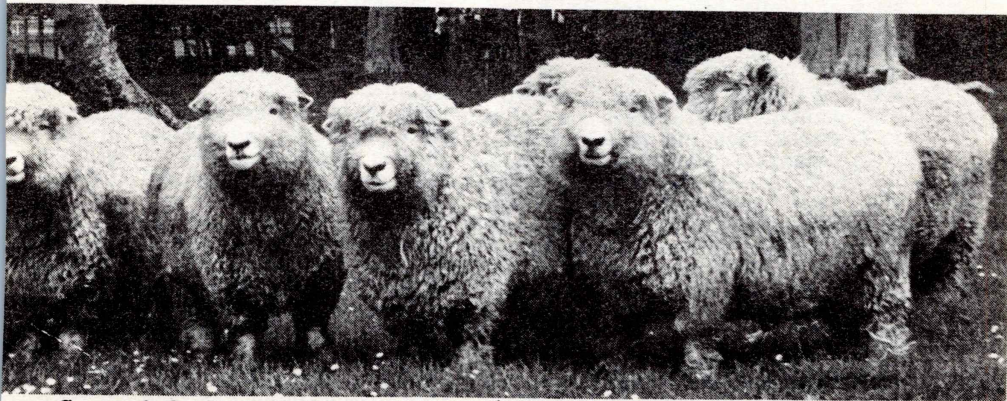
The herbs contain plant antibiotics which are grazed by animals. The plants also absorb the antibiotics produced by the various soil moulds. The best places for antibiotic formation are the shadowy parts with plenty of mouldy dead leaf. The moulds produce highly active ferments which continue to be active in the soil and are accepted by the plants. The grazing animals have them in their intestines and these mould ferments assist the digestion of inferior fodder like chaff, straw etc.

By resting a pasture 4 to 6 weeks and then grazing for one week, production is doubled as compared with continuous hard grazing. During the dry period in late summer, actively growing pasture is vital to the growth and health of the Romney hogget. At this time the aftermath (re-growth) of pasture that has been cut for hay or silage gives feed of great value.

The red clovers and chicory are especially active, and in a high fertility pasture, help to maintain succulence in the grasses associated with them. Chicory, we find, is particularly palatable, both to dairy cows and to sheep during a dry summer when it makes its maximum growth. Stalks as well as leaves are relished by them.

Summer shortages of nitrogen occur in the top layers of the soil as well as the considerable summer moisture loss with closely grazed pastures, especially with the drier soil types. This means a general lack of mineral intake by the plant and with the lack of vitality especially with perennial rye which often is badly rusted, such pasture is quite unsuited to young stock.

Drought affects the mineral content of such pasture and especially the vitamin content. In 1947/48 stock lost condition rapidly in the last stages of this drought.



Some of the Lockwood Romney stud rams bred by R. A. Buchanan, the author of this article.

The influence of deep-rooting plants like chicory affords protection against serious vitamin A deficiency. The reliance on ryegrass and white clover as the sole ingredients of pasture under many circumstances is asking for trouble.

The third and latest development is a special purpose pasture comprising: 16lbs of Ryecom per acre drilled in first, the paddock then rolled and sown with 30lbs of H1 or Italian rye, one ounce of soft white turnips, 3lbs of chicory, all per acre.

To start with, a paddock is shallow ploughed or rotary hoed in November, then fallowed through until late February. By deep tillering cultivation soil moisture is conserved. A tremendous lot of plant food is made available to the crop sown by the end of February.

Under dry conditions as experienced this autumn in the southern North Island area, we are grazing, 8 weeks from the time of sowing, 15 hoggets plus one 20-month PA heifer per acre—all kept in excellent health.

The heavy carrying capacity is usually maintained at 10 or 12 hoggets per acre through July and August. The freedom from scour and the bloom on the young two toothed during September and October has to be seen to be believed.

The availability of soil minerals rises and falls, being greatest in the late summer months, and there appears to be a correlation between increased biological activity in the soil and most rapid plant growth. The plants also are more palatable to livestock than old pasture plants. High humus content soils and increased micro-biological activity are inter-connected. Soil micro-organisms play a predominant part in the release of bound minerals so as to render amounts available which can be assimilated by the plant as required. It is considered the fallow and aeration of the paddock prior to sowing plays a vital part in getting better health in this latest grass crop which in turn gives excellent health to large numbers of sheep and cattle for 12 months.

With grasses alone approximately 15 per cent. of their dry matter is crude protein. Clovers alone have approximately 28 per cent. For this reason the clovers have been left out of the latest mixture, which has given striking results lasting for 12 months. On rich soils heavily stocked, the white clover is quite strong in the second year (on our country coming from nowhere as it were).

Another reason for leaving out the clover: the very high degree of digestibility of dominant white clover pasture, kept short, during January, February and March, normally dry months, puts hoggets into fine condition, although not into perfect health.

The same feed is disastrous from a fertility point of view. The excess protein, up to 40%, is very detrimental. White, red, and subterranean clovers and lucerne, when closely grazed, all appear to have an excess of female hormone (oestrogenic substances) which can cause rams or wethers to give milk.

Fertility is strongly linked with vitamin E.

It appears that the greater the clover content of a pasture the greater the selenium deficiency and here lies an important subject for investigation. As is well known, spectacular increases in lambing percentage have come about by the use of selenium on sand and pumice soils.

The lack of magnesium and cobalt etc., or their unavailability in high nitrates which are taken up into the overcome in this unusual pasture crop.

Recent research in the U.S.A. indicates that the presence of excess nitrogen can be detrimental to the health of both man and beast. This is because an excessive quantity of available nitrates appears to lead to their reconversion by bacteria to nitrates which are taken up into the sap stream of plants and in turn taken into the systems of animals. Some of the diseases which have

been directly traced to excessive nitrogen are abortion and tetany in cattle.

Grass tetany known in New Zealand as grass staggers is a major disease and an increasing disease condition due to a lack of magnesium.

The mineral substances in the soil are in a state of equilibrium. When a soluble element is strongly preponderant, such as nitrogen, then other materials are driven out of the solution precipitated. It is well known that a heavy potassium fertilising precipitates the soil magnesium. Where there is strong acidity, the magnesium is so vigorously absorbed by the soil that it is no longer in a condition available to the plant. The absolute magnesium content of such acid soil is of minor importance, it is its availability that matters.

Under continuous heavy rates of stocking the increasing disease becomes serious and complex. Not only is there the excess of crude protein but a marked deficiency in quality protein as well as the deficiency of carbohydrates. Plants may appear satisfactory but when they lack essential amino acids (building bricks of protein) then there is failure to nourish plant life.

Two amino acids essential for animal nutrition and often absent in plant protein are tryptophane (magnesium) and methionine (sulphur). The amino acids depend on the interaction of soil life. Mineral elements in the soil determine the percentages of the various amino acids in the nitrogen fraction of plants and thus affect the animal's resistance to harmful bacteria and parasitic worms. It is now known that the action of bacteria and trace elements are essential to the enzyme systems which determine the quality of protein in plants.

If the key to trace mineral deficiency is the aeration of the soil, then the increased use of our third and latest special purpose pasture appears a more rapid and effective way of restoring balance to a com-

plex situation, even allowing for doing this annually on a large scale.

It is known that an excess of nitrogen creates a deficiency of magnesium and cobalt and this can be largely overcome by taking a grain crop from the soil.

Four elements

potassium	sodium
calcium	magnesium

appear to become increasingly out of balance with continuous high stocking rates. We get high potash and low magnesium and sodium content.

Magnesium is not a trace element, 2oz. per day being required by dairy cows. Animals have no reserve of this element in their bodies.

The quality of plant protein besides its effect on animal nutrition is the prime factor in protecting the plant itself from disease and insect attack. Quality protein in plant and animal is our main defence against disease. An increase in vegetative growth is no criterion for assuming an increase in food production.

Only the proteins can transmit life, propagate themselves and regenerate new cells by their own division. There are 22 known amino acids within proteins. It is the provision of these specific parts of the protein more than nitrogen carrying compounds which becomes the focal point in our struggle for good nutrition.

Only plants and bacteria can synthesize simple ingredients to create proteins. Animals and humans must assemble theirs from plants, other animals or bacteria (some of them within the digestive tract). If you study protein you are in fact studying life.

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Herbal pastures pay dividends

There is an increasing number of Organic farmers in New Zealand and those who do practice this form of husbandry are proving that this system does pay dividends in the health of the stock.

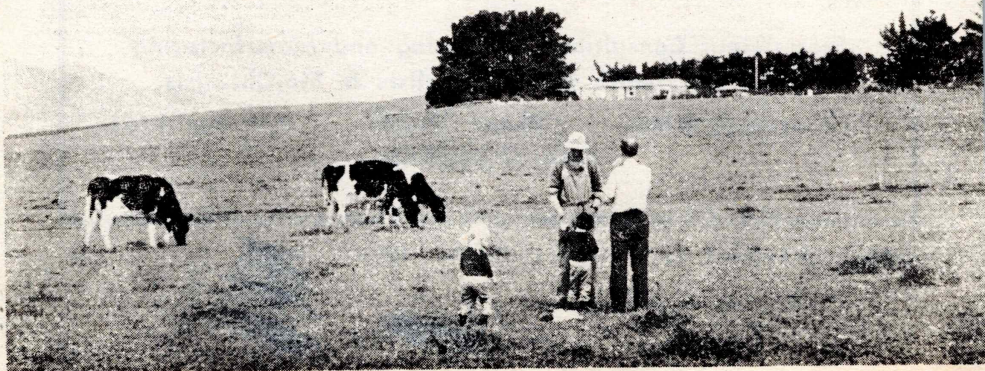
An instance of this took place recently on a 302-acre farm in the Hawarden area where an outbreak of stomach sickness occurred in many of the sheep in the district. A farmer changing to Organic methods is John Scott who has embarked on a new form of pasture in this area, an Organic herbal ley—and it has proved its worth. (An Organic herbal ley is one on which no chemical fertilisers are used and instead of the ryegrass/white clover mixture a mixture of deep rooting grasses and herbs are sown.)

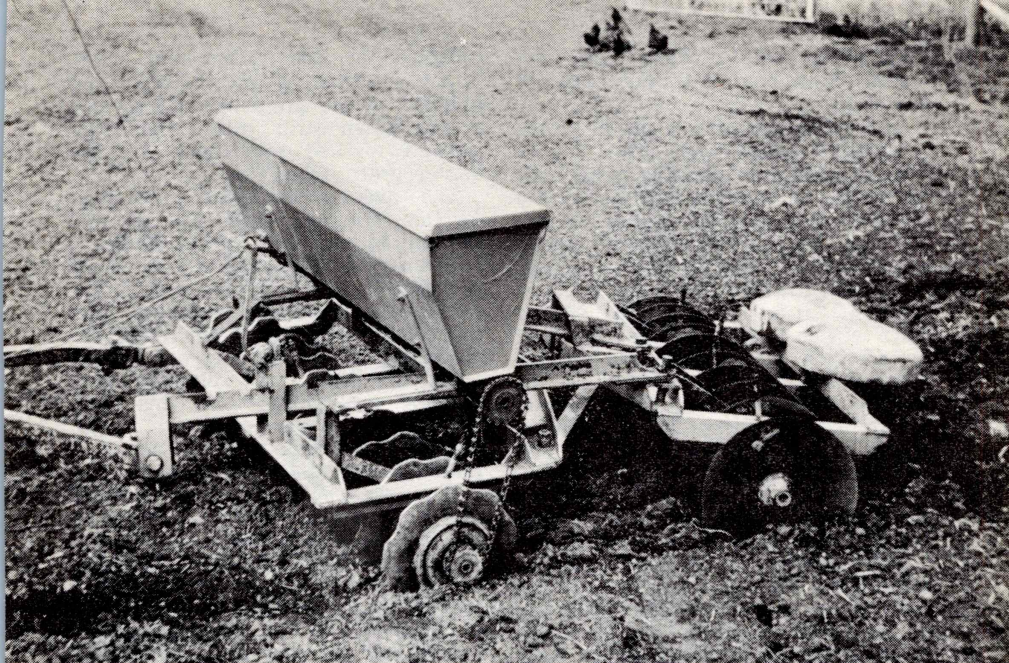
Keen observation is of prime importance in any successful farmer and here John Scott noticed that part of his flock of sheep were not faring too well. These he separated and put on his herbal pasture and they recovered and showed no further signs of the worm infestation that was

The National President of the Compost Society (Mr J. P. Whitelaw) and the Editor paid a visit to the Hawarden district recently and this article is the result of their observations and the information given to them by one of our farming members, John S. Scott.

general in the locality. This would tend to prove that the pastures containing trace elements and elements brought up from the sub-soil by the deep rooting plants played an all-important part in restoring these sheep to their normal healthy condition. In the meantime the remainder of the sheep, which through lack of adequate herbal pastures had been confined to the orthodox leys, became infected, and had to be drenched. The

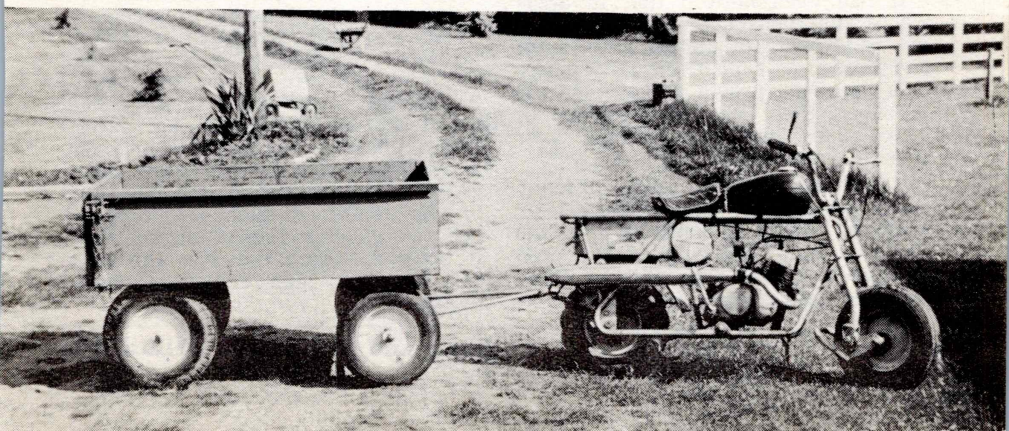
Some of John Scott's Friesian cows enjoying the herbal pasture. It can be envisaged that this can be and is a windswept area. That is one of the reasons why this farmer has instituted a major tree planting programme.





A set of discs with the seedbox mounted. This is driven by the chain drive seen in the foreground.

Below : Capable of carrying three ewes or seven lambs, this cart is powered by the motor-cycle attached to the front. As can be imagined, it has many uses and is a great saver of time for the farmer.



sheep that had recovered on the herbal pastures did not require drenching.

In a riverbed area a development scheme is under way. The 20-acre area at present in gorse is being built up to take lucerne. It is to be heavily Composted to provide a skin of topsoil and the gorse is being cut up by machinery and left to rot. Sawdust, straw and fowl manure are the major components in the Compost. Giant discs will be used to cut up gorse and trash which will rot down to provide more humus.

Crop residues after grain harvest are utilised and never burnt. After a wheat crop the straw is disced and oversown in russet oats. for greenfeed, a seed box mounted on the front gang of off-set tandem discs is used, thereby eliminating any problems usually found in drilling through straw. By leaving the straw on the surface in greenfeed, the incidence of lameness in sheep, due to earth building up and drying between their hooves, is considerably reduced.

A stand of young oregon trees aroused some interest, for these had been planted and each had two bales of straw in front in the form of a V to break the force of the strong north-west winds prevailing in the district.

An important point mentioned to the visitors was that the cows preferred the herbal pastures to the ryegrass/clover mixtures. On the latter they lost production, which they regained when put back on the herbal leys.

It had been noticed that in areas where superphosphate had been used in the growing of an oat crop, smut had occurred. On similar land where oats had been grown without the aid of super, there was no incidence of smut. This had been proved over several years of trial.

Trials had taken place growing maize with and without Compost on a poorer class of land. Where the Compost had been applied the crop was good, in the area without Compost the results were poor. This was

reflected in the subsequent crop, Italian Ryegrass, which was taller and greener on the previously Composted areas. When strip grazed the cattle showed marked preference for the darker green areas.

The average butterfat production for this farm was 468lb. per cow and the aim was to raise this to 500lb.

In an area where hot drying winds prevailed in the summer, with a low rainfall the herbal pastures stood out, the colour remaining green while the remainder of the farm turned brown.

An ambitious tree planting programme is underway on this farm with emphasis on hedgerows to encourage the birds, whose place in Nature is not underestimated.

It is planned that Composting will play an important part in building up the fertility of the land and the consequent health of the stock. Mechanical means are to be used and at present these are being built. Stocks of material to be Composted are assured and the next few years should see not only an increase in production, but a greatly increased interest amongst other farmers in the district who have already commented on the greenness of the herbal pastures this season.

MORE NITROGEN, MORE WATER

While all Organic Farmers dislike "artificials", it is the N in NPK which they chiefly associate with poorer quality of produce. This point has often been made in "Mother Earth": now others are tending to recognise it. In a recent article in a British farming newspaper, Mr J. Pearson, formerly agriculturist for the Spalding (Lincs) beet sugar factory, had no hesitation in identifying excessive applications of fertiliser nitrogen as the cause of a decline in the sugar content of beet. He pointed out that, in the 1930's, it took $6\frac{1}{2}$ tons of beet to yield a ton of sugar. Now it takes 8—which indicates the folly of so-called high-production techniques.

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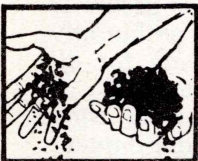
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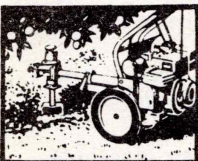
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Some thoughts on farming and agriculture

Many of the developments and chemicalisation of agriculture have not been sufficiently concerned with biological implications. The advantages sought and expected have not always been equated with the risks involved. Not infrequently, there has been complete concentration on immediate fruits with blind disregard of future consequences. The new chemicals which destroy crop pests also destroy insect and wild life which perform essential services in agriculture. Heavy applications of chemical fertilisers have raised the yields of crops but there are strong arguments, for which there is evidence accumulating, to suggest that this can be at the expense of biological quality . . .

The increasingly extensive use of chemical seed dressings and sprays to control pests and diseases has left residues in the soil, plant and water which may well become a serious threat to human health, if, indeed, the stage has not already been reached . . .

Traditional farming or husbandry has the essence of permanence and continuity . . .

The raw material of agriculture is LIFE; we cannot create it and there is no substitute for it, conserved and fostered within any biologically sound system of land-use, it is self-renewing for all time, but failure here on our part will end all hope of survival . . .

And here we come to the heart of the matter: how to bring Man into harmony with his vital environment, NOT the environment into harmony with Man. Man seems oblivious of the fact that by managing the environment for his own economic advantage he may be disrupting it for other forms of life which support him, and are, in fact, essential for his survival . . .

The function of agriculture, basically, is to nourish people and promote health and the function of the farmer is to produce the nourishment . . .

The ideal in land-use is a system of husbandry to produce maximum yields of foods of the highest quality, free from anything detrimental to health and without impairing future production. This is husbandry at its highest . . .

I believe that the interpretation of Organic farming should be presented in generous terms based on the fundamentals of good land use. I would define Organic farming as good husbandry designed for optimum yields of highest quality food, free from anything detrimental to health and without impairing future productivity.

(These are extracts from a paper delivered by R. Lindsay Robb of the Soil Association of Great Britain to the Attingham Conference in 1967.)

Organic Farming In South Canterbury

Successful farming should be built around a diversified form of husbandry. Any form of monoculture (such as sheep raising) leads to difficulties and here a South Canterbury farmer, who is using Organic principles on a 600 acre farm, tells how he is tackling the problem and the success achieved.

He writes as follows :

I have been farming on my own account for the past 20 years and at the start my efforts were towards bringing land from browntop-sweet vernal pasture to a ryegrass-white clover-dogstail mixture. Later it was red clover-timothy and cocksfoot. This, with the aid of tractors and lime, is really the ABC farming method.

Looking back I think that superphosphate has been, and still is, getting a lot of the credit that it has never earned and its continuance, together with only shallow rooting grasses, leads to grass grub infestation.

We are told by the Department of Agriculture that the average soil in South Canterbury contains 10,000lbs nitrogen, mostly locked up in the Organic matter, but owing to unsuitable climate only 30lbs of this vast storage of plant energy is available per year. Yet 300lbs of nitrogen is required per year to maintain a good pasture growth. The other 270lbs is inorganic nitrogen which is obtained from the air through white clover and through the urine of grazing animals.

This is not an Organic cycle because the nitrogen-fixing bacteria are only producing one-tenth of the total nitrogen.

The inorganic nitrogen is so strong that the soil almost becomes dead of biological soil life. Barley grass grows very strongly under these conditions. Even when cultivated, stinging nettle grows very well and if wheat is sown, virus soon appears. These results always seen to follow these methods. Grass grub appears

The writer of this article is farming some 600 acres. 400 acres under arable farming, both on the flats and hill tops, and 200 acres of hill face are being Keyline farmed and here a large-scale tree planting programme is under way. The Chisel plough is used once and where possible the land is over-sown.



very often and the soil is too toxic for other forms of soil life.

When we free the soil by cultivation we allow air and moisture in, and this helps create a suitable climate for the different types of soil bacteria to fix nitrogen and free the sulphur and trace elements in a sort of balance.

For a good soil, climate such as that prepared for autumn sown wheat, the micro-organisms in the soil soon fix enough plant food from the Organic matter in the soil to grow a good crop—that is why superphosphate gives no extra yield when sown with Autumn sown wheat.

Organic manure and Organic matter, which given the right soil treatment, supply all the necessary foods for plant nutrition and healthy growth, plus a marked resistance to disease.

Chemical manures, on the other hand, which are water-soluble acids, feed the plants, and thus the Organic cycle is broken until such time as pests (nature's censors) appear.

We cannot cure the soil conditions by sowing DDT. First and foremost

we must create the correct soil climate for our soil life.

Fortunately we have in New Zealand, in many cases, a great store of latent Organic matter in our soils, but we appear to have ignored its power under grassland soil conditions in South Canterbury. Perhaps this "locking up" of Organic matter does not occur in volcanic soils, but in our clay sub-soil country our soil does tighten up in South Canterbury, thus excluding the air and then moisture. Soil climate then becomes unsuitable for the soil organisms to work. Grass grub appears, DDT is applied and so the cycle goes on.

Of course, I am just learning Organic farming. To create a suitable soil climate is not as easy as it may seem in grass-land farming with sheep. Under a four-year ley, including deep-rooting herbs, it seems to work well enough. I sow 50 acres a year in wheat, 25 acres in rape, 25 acres in swedes and choumoulier, 25 acres in barley, and 25 acres in oats. All straw is baled and used by the stock for food and shelter. 50 acres are put back to grass each year. On this 200 acres it seems necessary to have at least a three to six months fallow to get good crops. Then on the other 200 acres I am fencing on the

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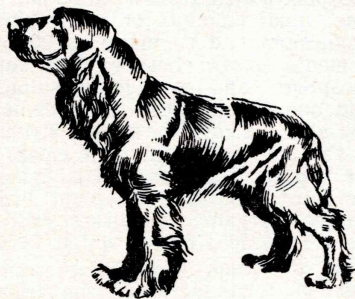
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Keyline principle using double-stay pig-proof netting with one barb wire top and bottom. I do half a mile a year, planting poplars and running pigs. The results in these areas is really good, with no grass grub or porina. It appears that the pigs relish them and they apparently keep them in balance.

This type of farming is more permanent and therefore requires more planning. Trees should not be planted too near boundaries, neither should pigs be run where they can be a nuisance.

In Keyline farming, one lowers the gravity force horizon, one inch below the present gravity horizon, once a year for two or three years depending on the present state of the pastures. It also encourages roots and air and moisture and worms to deepen this air or gravity pull to a foot or fifteen inches. Lime and animal manure are being washed down and pulled down by gravity force, and worms and plant roots are continu-



HECTOR W. JORDAN, M.B., B.S.: "In my opinion vivisection is both unnecessary and cruel. It is unnecessary because by now there is sufficient knowledge of the causes of disease and ill-health for us, if this were put into operation, to stamp out something like 80 per cent of disease. It has already been shown in communities like that of the Hunzas of N.W. India that correct feeding and living, combined with a sound agriculture, produces in the race of people a sound and healthy physique. . . . In my opinion vivisection is also cruel because there is absolutely no justification for it."

For further information write: **The British Union for the Abolition of Vivisection—Box 647, Auckland.**

ally bringing minerals up to the surface. Bare cultivation is never practised. Normally as little of the growth as possible is destroyed. No cultivation is done in the dormant period.

In Keyline farming I can see the picture change before my eyes, the rain falling on the hilltops being controlled at its very start. The first three inches is readily soaked into the new 15in soil horizon, the next three inches filtering through this deep black soil and filling the Keyline dams and being spread and controlled towards the Keyline trees.

The trees are growing well, covering and holding what used to be bare facings, protecting and guarding the soil and stock from winds and sun. They are bringing minerals up with their roots, and shedding their leaves.

Dr William Albrecht says: "Don't lime to fight soil acidity. Use lime to feed the plant." Insects and disease are the symptoms of a failing crop, not the cause of it. The use of sprays is an act of desperation in a dying agriculture. It's not the overpowering invader we must fear, but the weakened condition of the victim.

And then there is Professor Cooper and his creep feeding and Andre Voisin. These two men both agree that if we allowed Nature to play her part we would get three times the feed off our pastures. Andre Voisin also claims that all our virus diseases would disappear and stock health would abound.

Last but not least is Dr McMeekin. This man has left behind him the blueprints of the answer to our present market requirements for tender mature meat, but not fat. In this sane approach I can see a great future.

I would also like to report the progress I have made so far on Dr McMeekin's high-low nutrition plane, stock management. We are at present using the bacon from a pure-bred Berkshire pig which was well fed for

the first three months, then left run in the paddock for five months, only getting one supplementary feed per day of boiled meat scraps, or grain. It was slaughtered at eight months and weighed 149lb. The bacon is perfect, a nice mixture of lean and fat, in fact it is everything Dr McMeekan said it would be.

The lambs were also managed under the same high-low nutrition plan. Lambing started on 1st September, the respective mobs were then tailed when the youngest lambs were six weeks old. They were weaned at ten weeks and rotationally grazed until the 1st January. As the grass stopped growing in January I spread them out over the farm until 4th February when I drafted 619 or two thirds of them.

I had three different breeds of sires, Borders, Cheviots and Southdowns, in order to see if breed had any influence in relation to the production of lean meat, or to whether it was solely a nutritional factor as Dr McMeekan had found. The lambs were all grazed together but were killed in three different lines, 335 Cheviots, average weight 36.26lb, with 139 seconds with 5 rejects which were 1 bruised, 3 lympho, 1 pleurisy. 58 Southdowns, average weight 34.12lb with 11 seconds and 1 reject which was caloused. 227 Borders, average weight 35.73lb with 139 seconds, 4 rejects, 3 of which were deformed, 1 lympho.

I also killed one of each breed for ourselves and the result of the killing sheets were born out. That is, that the Borders were if anything leaner. However, they didn't seem to do so well.

Our lambs put on a high plane of nutrition for ten weeks, then weaned on to Keyline pastures which wouldn't dry out so readily, should be kept on this high-low nutrition diet with the growth tapering off so that they can gain fitness before being killed for human consumption. Pies too, being fed on a high plane of diet for the first 16 weeks then on a high-low diet for the next 16 weeks reached 200lb live weight at 32 weeks, producing the healthy, lean, tender bacon that the public wants. This

applies to cattle also. It would suit the beef producer too as we could keep our cattle one winter and two summers. Let us change the word fat stock for fit stock. Dr McMeekan proved that by nutrition alone, taking pigs all from one litter, he could change the body conformation. Putting inches of fat on with the use of a low-high plane of diet produces the lard hogs of the U.S.A. corn belt. Isn't that what we are doing with our stock and then blaming the breeds?

Dr McMeekan proved that if we feed under his recommended diet our animals would put on 400 per cent more meat on the loin and pelvis than those started on the low plane of nutrition and then fattened. In order to get our poorer result we now go to the trouble of growing special crops.

Contrary to what most composters think, any ground rock that hasn't been treated with strong acid, to increase the water solubility, makes good safe fertiliser, recommended to be used in small quantities by a leading man in this field, Dr William Albrecht.

Fine ground phosphate rock for instance contains 30 to 40 per cent phosphoric acid, from 30 to 50 per cent lime, small amounts of iron, sulphur, magnesium and as many as 20 trace elements, it is cheaper than superphosphate, and by adding sulphuric acid one destroys the trace elements, and also destroys the crumb structure in the soil, which in turn closes off the supply of CO₂ which is essential for insect control, and plant health, whereas organic fertilisers increase the CO₂ concentration which in turn helps to break down crop residue. This in turn increases the organic matter by which the 2 per cent nitrogen it contains is carried in the soil, as the organic matter decays, the nitrogen is set free in a form that is available to plants.

This is a very important fact for the organic farmer as he can obtain all his minerals from phosphate, potash, basalts rocks, but rarely do rocks contain nitrogen. That is why I found it a must, to make a complete break with all chemical treated fertilisers.

Farming for Health

In discussing Organic Farming or Farming for Health (soil, pastures, stock and humans) we must realise that one cannot split health into various compartments, it is the overall picture that we must encompass.

To start with we must have healthy soil, that is the prime essential and this is the first step to be taken. Having built up our soil fertility we then can achieve healthy plants grown in that soil and it follows that, if the plants are healthy and in turn full of vitamins and minerals, then the stock and humans feeding off them have every chance of being healthy.

To obtain healthy soil we must have these things, air, moisture, warmth and organic matter. These are necessary to maintain the biological life of the soil—for our soil is a living thing, not an inert mass of "dirt". If we can keep the soil micro-organisms busy and well supplied with food (organic matter) then our soils will be healthy.

All the artificial fertilisers applied do not make a soil healthy, they may stimulate extra growth of crop or pasture but they more often than not interfere with the unpaid workers of the soil, the millions of bacteria, the actinomycetes, the fungi and the earthworms who all have a definite part to play in the pattern of Nature.

It is up to the farmer to see that all organic matter is returned to the soil, no matter what form the organic matter may take. This can be crop residues, wastes of many kinds, weeds and animal manures whether from pigsties, cowsheds, wool sheds or fowlhouses. This material should be made into Compost to utilise its greatest value and is then in a ready form to apply to

the land. All straw, weeds and green manure crops can be disced or hoed back into the topsoil so that the air and moisture can get at them. It is in the presence of air that the active bacteria (aerobic—living in the presence of air) can work and they soon set off the chain of decomposition that takes place.

If we farmers could only visualise the amount of straw that could be taken off one paddock in a lifetime—if it was saved and put back at one time I am sure that it would be fence high!

Earlier I mentioned air, moisture and warmth. Air is the cheapest manure a farmer can obtain. With the addition of air the soil becomes a living mass of bacteria and insect life—unpaid workers—working day and night, breaking down organic matter into soluble elements and releasing minerals so that plants can absorb them.

Warmth in the soil is not only created by the sun, the intense activity of the bacteria creates warmth in soil just as it does in the Compost stack.

Moisture is not only a matter of rainfall, it is also a question of retaining moisture in the soil for a long period. Soil rich in organic matter absorbs moisture like a sponge and releases it slowly.

Mr P. A. Yeomans in his book "Challenge of Landscape" states that while it is not possible to alter the climate of any district a farmer can alter the climate of his soil. By means of the Chisel Plough the soil is aerated and stirred but not inverted. It has been proved that deep ploughing only weakens the humus content of the soil for it distributes what humus there is through ten to sixteen inches of soil instead of in the top six inches where Nature meant it to be. We Organic Farmers try to work with Nature instead of against her.

(next page, please)

To give readers some idea of the value of aerating the soil I will quote again from Mr Yeoman's book. He was called to advise on a farm carrying ten ewes to the acre. On this farm with a high carrying capacity, all the lambs were dying at birth and the only solution seemed to move the sheep to poorer hill country. Mr Yeoman advised running the chisel plough over the pastures after he had inspected the soil and found it lifeless. After using the chisel plough no further trouble was experienced. This proves the value of air which in this case stimulated the action of the bacteria and caused them to perform their usual function again.

The chisel plough should be used at the root zone, as this breaks off roots which are feed for the worms and other soil life.

With a healthy soil we can expect healthy plants. By planting a wide variety of plants we do several things, the deep rooting ones go down and break up the hard pan and also bring up trace elements from the subsoil. The clovers add nitrogen to the soil through the action of the nitrifying bacterial action on their roots. Other plants like Cocksfoot and Phalaris Tuberosa form deep masses of roots and help to build up organic matter.

A good mixture for a permanent pasture is 6 to 8lbs of Lucerne, 2lbs Phalaris Tuberosa, 2lbs Timothy, 2lbs Chicory, 1lb Ribgrass (plantago major) and 2lbs White Clover. In this mixture we have an all year round pasture. Lucerne for dry weather, chicory for herbal properties and deep rooting while Phalaris is a good winter grower and humus builder. Timothy is known as the king of grass in America and white clover adds nitrogen. This mixture is most resistant to grass grub and makes very good hay.

For sowing green feed the addition of half a bushel of vetches or tares to the acre makes a far more balanced food. This has been proved

by stud sheep breeders who pay up to £4/10/- per sack for Tares. For fattening sheep the ideal mixture is 1lb Lupins, Arboreus, half a pound of Tares and 4lbs Rape.

One year I fattened 300 lambs bought from a well known farmer who could not fatten them in a wet season on eight acres.

The Organic Farmer who aims to work in close liaison with Nature has as big a variety of animals as possible. Sheep do well after cows, pigs thrive on cow paddocks as do poultry etc.

As farmers we must not judge one type of animal on financial consideration alone, we must see how each type of animal fits into the total ecological pattern with the other animals on the farm. For instance the cows may be the least paying animals on the farm if all the hours spent milking and feeding are taken into consideration, but let us bear in mind how well the lambs or hoggets do in the cow paddock. The same can be said of pigs, they are hard on fences and may root up some pasture but these animals are unbeatable at building up soil fertility. Another great advantage of pigs is that they can be used to clean up grain that has been lost owing to unfavourable weather. Pigs also eat unsaleable root crops.

Fodder Beet gives an excellent return per acre and can be fed to all animals.

Compost should be made on all farms if only for the home garden and for growing root crops. Compost stacks can be built up with the aid of the front end loader and it can easily be spread by means of the bulk lime sower. We spread 90 tons one year.

Farmers will ask how does Organic Farming compare with orthodox farming as far as financial returns go? We have found that this system can cut costs in many ways.

On my own farm, for example, in the past 27 years I have only used 2 tons of Superphosphate and no other artificial fertilisers at all during that time, and only a limited

quantity of lime. I have never used any sprays or insecticides on the property. The vet has never been to attend to my pigs, nor have I had sheep foot-rot. Neither have I had any kind of udder trouble with my cows and there is no difficulty in getting them into calf. No cow has

ever been lost through bloat and all are T.B. free. The sows raise litters until 8-9 years old.

My wheat crop is grown from my own seed, is not treated with anything and I am using the tenth generation of my own seed.

With Organic farming the soil is easier to work and tests conducted on Organic, mixed and stockless farms at Haughley (England) show that up to three gallons of fuel can be saved when ploughing the same sized paddock if it has been treated as an Organic farmer would treat it. The land on an Organic farm can

be worked sooner after rain and cows eat less and yet give higher returns with greater solids—other than fat—returns. Roots are easier to lift and are cleaner.

Organic farmers need little if any sprays. These can be expensive and may have a very dangerous long-term effect on both our soil and our health.

With the organic system we can farm as close to Nature as possible, do without the hazards of spraying and the toxic build-up in our soils. We can carry a wide variety of plants and animals all in good health and make our farming a pleasant way of life instead of an area of dead soil, undernourished plants, sick animals and crowded hospitals with large waiting lists.

Living with Nature as an Organic farmer does is an investment in health and general wellbeing!

Readers of this journal are invited to subscribe to **SOIL & HEALTH**, become members of the Compost Society, and so make contact with Organic farmers. In this way they can exchange ideas and visits to other Organic farms.

Many who have followed the practices advocated in this journal find that they have minimised disease on their farms without recourse to poisons or insecticides and at the same time seen an improvement in the health of their stock and crops.

You too can keep up-to-date with Organic farming by subscribing to this journal. Send \$2 today to R. E. Betteridge, National Secretary, 27 Collins St., Addington, Christchurch 2.

Name

Address

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(PRINT PLEASE)

EFFECT OF CHEMICALS IS CAUSING CONCERN

Concern is growing among farmers at the apparent need for and the effects on health of DDT and other chemicals used in the fight against porina and grass grub.

Present reliance on chemicals for the control of these pests is untenable to many older farmers. Both pests are natives and today's problem is nothing new.

Many believe that some farming practices used today and endorsed by the Department of Agriculture are encouraging rather than controlling the pests.

Management practices in the past have successfully combated porina and grass grub. Why shouldn't they today?

One farmer who is convinced that chemicals are not the answer to our problem is Mr J. W. Nicolls, an organic farmer of North Otago.

In this article he makes some provocative comments on present policies and thoughtful suggestions on how to solve our present pasture pest problem.

A short time ago a highly qualified nutritionist mentioned to me 40,000 enzymes in one liver cell—it would make very little difference if there were only 39,999 or even only 10, because a cell is something to be seen only through a microscope, and as I understand it, an enzyme is a substance which arranges that some biochemical process takes place.

Now the same sort of complexity is involved in the growth and nutrition of plants, while the goings on in the soil among bacteria, fungi, etc., appear to be more complicated and very much less understood.

No Aids

There have always been farmers who farmed to a very high standard of productivity with health and without chemical aids.

If the general standard of farming could be raised to approximate the best in the past, automatically raising quality as well as quantity, the only

mineral additives necessary would be the few elements which are found to be actually deficient—not simply unavailable through bad farming.

These minerals could be supplied in a form calculated to cause the least interference with natural processes.

Necessities

The fundamental necessities are comparatively simple—see the great farmers of the past—while advisers could be really useful with techniques of farming.

It has been said that it is useless trying to establish predators of the grubs while using DDT. I have some experience which bears on this point.

A few years ago I found porina grubs on the farm which I occupied for 42 years. Some had gone hard like sticks so they could be snapped. Others were full of creamy liquid.

The hard ones were diagnosed as having been killed by a fungus, the others probably by a virus.

Heavy Count

In June when I found these grubs there was a fairly heavy count. Early in August I had difficulty in finding grubs—dead or alive.

At the end of August a note in the local paper reported that grub damage was healing over as a result of using DDT. My patches had healed over three weeks or so before.

I have never used DDT. I claim to have had no appreciable loss from grub attack for at least 25 years and propose now to stick my neck out to the extent of stating some practices, approved by the Department of Agriculture, which aggravate grub trouble, and some which I think reduce it.

Greatest Cause

The greatest single cause of trouble is the slavish reliance on ryegrass and white clover. The only reason I can

see for this non-farmerlike policy is the official urge to use superphosphate.

Super promotes white clover growth to supply nitrogen for the ryegrass, which under several sets of circumstances loses vitality and is an easy prey to the grubs.

A very interesting sidelight on this came out at a special farmers' meeting on grubs some years ago.

A farmer, sowing ryegrass and white clover, realised when nearly finished that his seed would run out. He cut down his seeding rate drastically.

In due course the grub wiped out the thickly sown part leaving the strong uncrowded plants unharmed.

I remember walking through a very good ryegrass paddock which had a fair amount of dogstail. The dogstail was eaten hard down among the 3in. ryegrass.

Written Off

Dogstail is written off officially because it does not produce enough bulk. The owner assured me that the bulk came on his lambs.

There are other grasses which have failed under inept trials that could replace ryegrass and not only remove the grub menace but also immensely benefit soil fertility and health.

As soil improves promoting water retention, drainage and aeration, I can recommend phalaris tuberosa, cocksfoot, timothy and crested dogstail.

Mixed with suitable clovers, lucerne, not too heavily seeded and properly managed, these grasses together would allow many farmers to walk straight out from under their worst troubles.

Immune

Phalaris appears to be completely immune to grub damage but has certain snags if it is dominant. A Manawatu farmer reported that phalaris solved his pugging troubles in winter.

There is evidence that the inclusion of chicory would be beneficial. In some cases the inclusion of 3 or 4lb. of Italian or H1 might be worth while for a quick bite, but management of these mixed deep rooting grasses differs from that of ryegrass.

The burning of straw, advocated by some advisers, is a factor of some importance in the grass grub battle, but I am informed that the presence of straw and of the porina-killing fungus may be connected.

Indifference

The most regrettable peculiarity of the department is its complete indifference to Municipal Composting.

In case anyone imagines that this is a trivial matter, on the basis of what is available in Oamaru, New Zealand production without using sewage could approach 500,000 yards a year, which would greatly increase crops on 500,000 acres—not for one season but for years.

Overseas funds would be earned and saved—the one point likely to interest officialdom.

I have used this product at rates from one-quarter to one yard an acre and I know this Compost is valuable.

Just as the thinly sown ryegrass withstood grub attack, so does grass grown on soil fortified with Compost resist grub as well as drought.

Also the presence of Compost will almost certainly promote grub control by predators. Applications to stubble before working is good practice.

Perhaps it is as well that the Department of Agriculture has so far ignored Municipal Compost. They would almost certainly have approached it as a chemical problem whereas it is primarily biological.

Investigation is urgently needed, but if done by the Department of Agriculture it should be supervised by someone more versed and interested in biology than the department is at present.

—Agricultural writer in "The Otago Daily Times".

EROSION CONTROL and ORGANIC FARMING

The application of ecology and technology to the restoration of eroded landscapes.

The term "soil conservation" has various interpretations and meanings and there are different approaches to any particular landscape or catchment problem in our efforts to achieve conservation. It is common for many to regard the total retirement of land from use as being the only possible conservation action, the locking up of the land being considered the only economic course to achieve control over soil erosion and flooding run-off, by allowing natural regeneration processes to slowly heal the landscape.

While this procedure has worked very well in many instances there is another concept of conservation that is being increasingly adopted and applied in all parts of the world as pressure on our land and soil resources steadily increases. We are finding that we can no longer afford to just "lock up" land. We are forced to use all our land and use it in the correct manner so that the whole community and the land owner receive the full benefit of optimum production from the land.

Soil conservators and the agencies concerned with soil erosion and river control now mainly approach these conservation problems on the basis that soil conservation implies full use of the resource without abuse; in other words—that soil conservation is the management of the land according to its capability and according to its needs, in order to achieve the maximum production of crops, forests, water, etc., on a sustained yield basis in perpetuity.

This concept of "use without abuse" logically calls for intensive land treatments, especially where the erosion problem is severe, and for the application of all the skills and knowledge pertaining to land including those of environmental ecology and modern agricultural technology.

The restoration of the eroded Wither Hills to the south of Blenheim is a case in point. The severe and extreme gully erosion on the loessial soils of this area is an unsightly landmark in Marlborough and has aroused much comment over the years both locally and from visitors to the district. At the time of white settlement, over 120 years ago, the Wither Hills were stable, densely clothed in silver tussock and exhibiting little signs of erosion.

Indeed, the Maoris used to visit the area in their canoes from the North Island in order to cut the long tussock for thatching their whares. The vigorous tussock was unsuitable feed for sheep and the early settlers quickly burnt the hills to obtain feed and access for their flocks.

After some decades of this treatment rabbits increased in numbers to the point where uncontrolled hordes devastated the now much reduced tussock and grass cover. This exposed large areas of bare soil which cracked in the long hours of Marlborough sunshine and droughts.

Blenheim holds the sunshine record for New Zealand in most years. Incidentally, although the rainfall of this area is 23 inches per year, the rate of evaporation is also the highest in New Zealand and averages about 50 inches per year.



A typical gully before treatment; this gives some idea of the scope of the undertaking.

On these cracked bare surfaces rain water ran off into the soil cracks straight down into the subsoil which became saturated to the point of "melt" or flow and started the now famous tunnel gullies or "under-runners". Slowly the tunnel gullies enlarged, the rabbit invasion became worse and eradication even more difficult. The tunnel gullies enlarged, collapsed or subsided and became large cavernous surface depressions with vertical silt walls scored and interlaced with underground tunnels 15-20 feet deep, so that even progress on foot becomes difficult.

The silver tussock disappeared and has been replaced with tough wiry Danthonia, the only grass capable of withstanding the induced extremes of hard sunlight and soil moisture deficit. The vertical gullyng severed the normal water tables and caused excessively free drainage, thus drying the slopes out to the point where hard dry desert conditions prevailed either side of the gullies where practically nothing would grow.

By 1930 the process of degradation was almost complete and not only were the hills rapidly becoming totally unproductive but the silt discharged to the lower levels was gradually filling up the drainage channels of the flood-plain, threatening to reduce production from the fertile cropping land of the main valley floor. Urban development of the southern parts of Blenheim Borough were also adversely affected.

This was the scene in the thirties at a time when the exploitive dust bowl experiences of the U.S.A. were forcing on that nation the desperate need for conservation . . . a similar reaction began to take place on the Wither Hills. The rabbit was declared enemy number one, Rabbit Boards were strengthened and adopted a "killer" policy and slowly rabbit numbers began to decline. Fire was no longer used to "freshen up" the grass cover and more care was taken with sheep husbandry and stocking.

The hills began slowly to recover—not to silver tussock but to a patchy

uneven cover of *Danthonia*. In 1944 an experimental area was purchased by the Soil Conservation and Rivers Control Council and experimental conservation work and trials were commenced. At no stage was the "lock up" conservation policy adopted. All the efforts of the land owners and most of the community were directed towards a restoration of the land to a stable productive level.

In 1958, under the aegis of the Marlborough Catchment Board, a positive rehabilitation scheme for the main catchment of the Wither Hills was adopted by nine out of the ten land owners — each farmer operating according to a farm conservation plan prepared to suit the capability and economics of the individual properties.

This overall conservation approach was a major step forward and resulted from the necessity, in dealing with problems of disturbed environment, to approach such problems on the basis of treating the whole environment and not merely the part — thus arriving at a positive and balanced approach to a problem largely brought about by a fragmented approach to land use which ignored the concept of biological balance.

Although acting independently the individual farmers, assisted and supported by community works executed by the Catchment Board, have, in concert, already produced a highly satisfactory end result both for themselves and for the flood relief of the lower catchment.

Although rabbit control and the elimination of fire greatly improved matters, the decades of wrongful land use had left an appalling legacy in the form of 3,500 acres of severe and extreme gully erosion, together with thousands of acres of unproductive sheet eroded *Danthonia* dominant pastures. The gullies in particular continued to erode with every rain and in some places had cut down to the extremely erodible gravels below the cap of loessial soil and here the gullies were spewing out hundreds of



*Organic farmer, Alby Neale, standing in a sward of *Phalaris Tuberosa* in a gully allowed to go to seed.*

tons of sterile shingle and boulders into the main stream. No amount of "locking up" or retirement could heal these deeply incised gullies — they were past the point of natural healing.

Measures used to restore the soils have been many and varied, but in most cases the treatments have been based in part, or wholly, on the ecology of the environment and have attempted in one form or another to work with nature to restore balance.

The first major and real problem of the Wither Hills has been the **restoration of the original level of organic matter or humus content** which had been burnt out with fire and overgrazing and oxidised away by ex-

posure to sunlight and dry desiccating winds.

This protective mantle of organic matter which absorbed and controlled the interception, regulation and infiltration of erosive rain water, if destroyed, must be restored before any real progress can be made. A logical approach—the application of massive amounts of Municipal Compost—was impossible economically, even if available locally, which it is not. Trials some years ago, however, did show that this technique had much promise.

Therefore the only solution to the problem of organic matter has been the old and tried method of establishing a nitrogen cycle in situ by the use of clover nitrogen-fixing bacteria and animal dung and urine.

Clover establishment has, however, proved difficult. It has been found that the fire induced regressive *Danthonia* swards have (in many ways similar to the ancient heaths of Europe) developed toxic properties inimical to desirable soil bacteria and fungi. This has meant that, where possible, this grass must be eradicated by cultivation or some other means. (In some areas the use of chemicals is advocated by the Dept. of Agriculture, but this has not, as yet, been employed except as a trial.)

The procedure worked out to deal with this extremely difficult problem has been to firstly fence into small enough paddocks to enable sizeable mobs of both sheep and cattle to be grazed. (So far some 20 miles of fences have been built.) Where practicable bulldozers have been used to destroy the steep sided gullies with a diagonal downhill cut, filling them in and achieving maximum compaction and surface soil-spread—this restores the natural water table to bring sub-surface moisture back within reach of surface rooting plants. After bulldozing the loose-fill areas and adjacent non-gullied areas are worked as deeply as possible on the contour, or keyline, with a chisel plough. As slopes are within the

range 22-30 degrees this work is not easy and there is a considerable risk element as heavy rains at or just before sowing can cause rill and surface slip erosion. Such damage as does occur in this way is usually minor relative to the original problem and is minimised by the contour chisel ploughing.

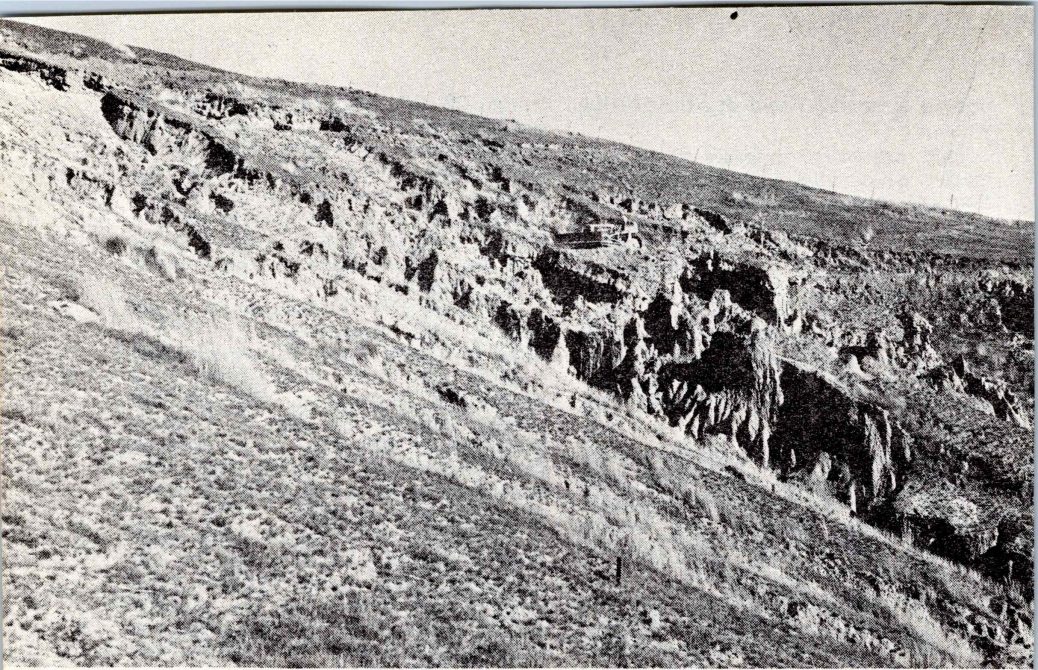
The paddocks are then sown in the Spring with lucerne under a cover crop of either Cape Barley or Blue Lupins, eaten off then sown to a permanent pasture in the autumn which includes 2-3 lbs of *Phalaris Tuberosa* in the mixture, as well as the conventional species with the exception of Ryegrass which is sown in light amounts only.

The objective of sowing the deep-rooting grasses and clovers is to promote, firstly, strong erosion resistant rooting similar to the original Silver Tussock and, secondly, to make greater use of the soil medium and soil moisture.

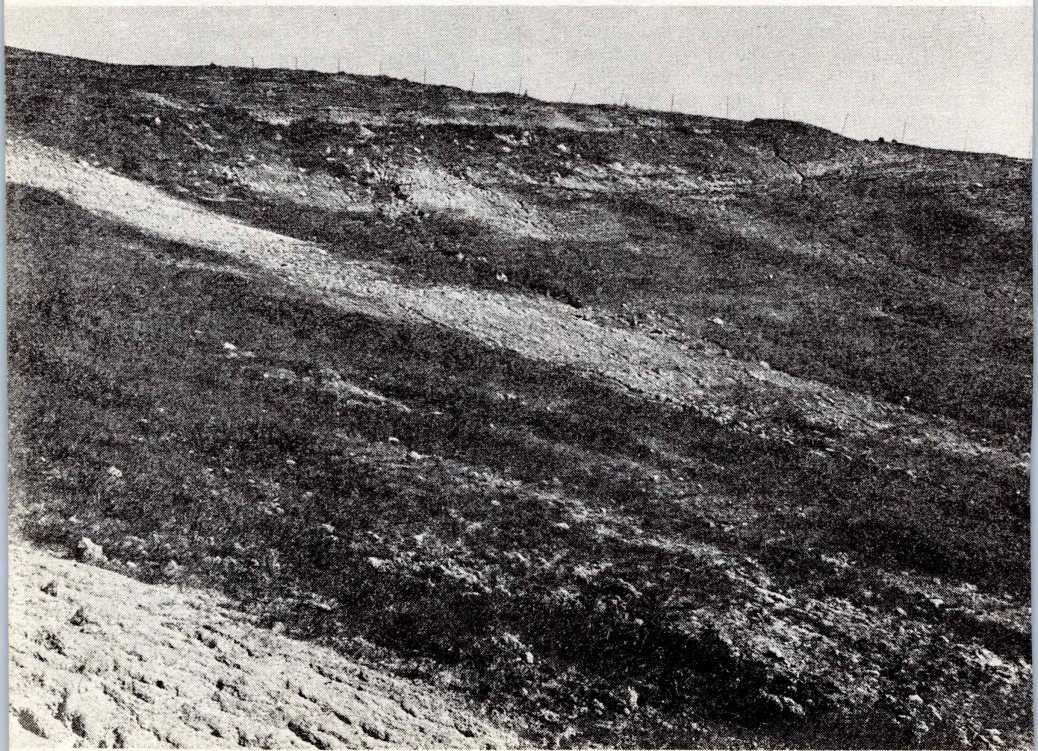
This first principle of the organic farmer—the mixed pasture of deep rooting species—has worked extremely well on the Wither Hills in providing a deep-rooting erosion resistant, high producing sward.

Soil analysis has shown that although these loessial soils are generally rich in most nutrients they are low in total phosphate and one of the measures taken has been to apply phosphatic fertiliser when sowing these pastures to help overcome this natural deficiency. Lime has also been used to assist clover establishment and to help ameliorate the raw clay exposed by the bulldozing. This approach, therefore, has seen the combining of ecological principles with modern machinery to produce a successful end result of mixed pastures capable of supporting high rates of stocking, thus ensuring adequate organic dung and urine return to the soil to provide sufficient organic matter to produce the desired end result of erosion control.

So far, under the scheme, some 700 acres of gullies have been bull-



Before and after treatment; note the bulldozer in the middle of top photo.



dozed. Other measures have included cattle trampling of hill pastures, ordinary oversowing and topdressing (1,450 acres), mulching and seeding of residual bare clay patches—an inevitable relic after such massive land surgery. Very bad gullies at the lower more sheltered levels are fenced off and planted to trees to stabilise the gullies and provide shade and shelter. The harsh sites have rendered this work heartbreaking in the extreme. Total failures due to summer droughts are not uncommon. Even trees several years old will die in a dry summer. Poplars and willows have proved the most successful species so far used and their deciduous habit has the added advantage of providing a soil improving leaf litter.

The key to maintenance of the restored fertility lies almost completely in the follow up stock management employed.

If possible all grazing on critical sites is with cattle only, young calves on new pastures and management aims as a first consideration at pasture vigour and full cover with a maximum return of animal dung and urine. The feeding of hay during winter months on difficult bare sites is essential to ensure full recovery. Close grazing by sheep on the Wither Hills is undesirable. Cattle with their lax grazing habit and favourable bacterial action of their droppings do not damage but steadily improve the soil. Even badly sheet eroded pastures can heal over under careful cattle grazing management.

The results from this apparently complex but basically simple conservation project have been very heartening. The Lucerne/Phalaris pasture mixtures have led to a greatly increased animal productivity in terms of cattle usage and fat stock beef production. Fodder from green lucerne is now available on the hills even in the driest summer and the cold season production from Phalaris overcomes the dormancy of sub-clover, white clover, Cocksfoot and Ryegrass during this period.

The vast area of acute soil erosion is slowly responding to the various treatments and to date it is estimated that of the 3,500 acres of severe erosion in the catchment, 1,500 acres have now been fully treated plus another 2,000 acres partially recovered. Hand in hand with this erosion control there have been considerable increases in production from the land.

Stock production over those farms working to planned farm conservation programmes has increased by 2,883 ewe equivalents or 54% in nine years. One hill paddock bulldozed, contour chisel ploughed on a keyline and sown to a straight Lucerne/Phalaris mixture has averaged 5.6 ewe equivalents over the last three years. Previous carrying capacity on many of these Danthonia paddocks was less than one sheep to two acres.

In addition production from the land on the flood plain below has increased due to better drainage (less silting) and less flooding. Crops such as wheat and barley are up 10-20 bushels per acre and lucerne seed can be harvested (previously not possible). In Blenheim urban development has gone ahead with confidence beneath the stabilised hill slopes and modern new housing settlements have mushroomed in these previously neglected areas, where floodwaters cut roads, blocked culverts with debris and generally depressed the area.

Although it is not easy to assess all the costs and benefits of such a project in financial terms it is interesting to study the investment of private and public funds in this case. So far to date the total cost of the Wither Hills scheme has been \$205,000 (including downstream engineering flood control and drainage measures). Of this the Government has found \$118,000 the balance being found by the farmers and a local rating district. The benefits, both off-site and on-site, comprise not only the increased farm production men-

tioned above but also soil saved from total erosion loss; increased district and business confidence in farming the area; improvements in farm valuations and, therefore, increased rating potential for local authorities and land tax and death duties as government revenue; improved farm incomes leading to higher income tax payable; improved scenic values; improved fire protection, stock shelter and shade. The range of benefits is very wide because it also includes such things as reduced flooding and sediment discharge—this gives lower rates for less costly capital drain construction and storm water disposal and maintenance and reduced flood threats to the streets of Blenheim and no less than four main trunk railway culverts and two main highway bridges.

The estimated present value to date of all these benefits is \$367,000. When the scheme is finally completed in ten years or so the final total cost will be about \$333,000, of which the Government will have found \$187,000. The estimated value of all benefits resulting at that time is \$960,000.

It is thus clear that a soil conservation policy of maximum

"use without abuse" is a paying proposition for everybody concerned.

A further study of alternative treatments using methods of cost/benefit analysis confirms this approach as the most satisfactory from an economic point of view. For example, if a policy of just doing nothing about the problem is adopted, i.e., a status quo approach, there is a financial loss to the nation of minus \$225,000. If the catchment were to be locked up and retired there would be an even heavier loss of minus \$686,000. Afforestation or planting to trees would, because of the high failure rate and slow growth of the trees be even more costly at minus \$1,200,000. On the other hand the present conservation programme with all its costs and benefits as stated will give a plus or positive benefit of \$670,000. There would appear to be no doubt whatever that the positive application of modern agricultural technology integrated with carefully applied ecological principles and organic farming techniques has resolved an extremely serious erosion problem to the benefit of all.

* Chief Soil Conservator, Marlborough Catchment Board, Blenheim.

Insects Lured Off With Turnip Diet

Trick springtail insects away from lucerne crops by appealing to their palate, an entomologist, Mr J. M. Kelsey, advised farmers recently.

Mr Kelsey, who is with the Entomology Division of the Department of Scientific and Industrial Research at Lincoln put this suggestion as a practical means of control of springtails without resorting to chemical sprays.

The suggestion followed observation by the Department of a crop of lucerne where the springtail population was four hundred a square foot. This was double the number regarded as sufficient to completely destroy a crop.

Entomologists observed the crop for one month and were surprised that no damage was being done to the lucerne. The explanation was that some self-sown wild turnips were in the crop and the springtails liked them so much they ignored the lucerne.

By the time the turnips were eaten out the lucerne was beyond the stage where it could be damaged.

Mr Kelsey's recipe for springtail control in lucerne crops is the sowing of a ½ oz of brassica seed an acre along with the lucerne seed.

Footrot in Sheep

The question of sheep health, mixed stock, and the wet year 1968, reminds me of an experience which I think is very closely connected with these three subjects, certainly with the wet: there was a great deal of footrot in the district in 1957, and Corriedales are supposed to be more susceptible than Romneys—the old Romney, which shorn only about 6lbs of kempy wool, was undoubtedly highly resistant to foot-rot and most other ills.

At one time or another I suppose most of my neighbours have said "Wait till we get a wet season, then you'll cop it", or words to that effect. In 1957 I was watching anxiously for signs of foot-rot, which curse I had had here twice and I had my fill of it as a boy in the North Island. Any lame ewe was caught, feet trimmed and carefully examined. There were numerous lame ewes because of mud hardening into spacers between their toes, evidently very painful.

At last I caught a lame ewe, trimmed her feet, and there was the typical black stinking undermining of the shell, perhaps eaten half-way up the hoof. As I say, I have seen quite a lot of foot-rot and I am sure that ewe was affected.

There was a gateway nearby which had been limed some time previously where I knew there would be a certain amount of horse, cow and sheep droppings.

I got a little damp earth from that gateway and dressed that ewe's foot with it—and have seen no sign of foot-rot in this flock since.

I did not say much about that episode for some years because it soon became very dry and most of the foot-rot in the district quietened down. The '61-'62 season was fairly wet so the foot-rot reappeared in most flocks, though not in my "susceptible" Corriedales. Some time in the late summer I took some selected earth to a friend's farm and dressed a really bad foot on a 2-tooth ewe he had bought. I trimmed that foot myself and there was practically no shell left, just a foul slimy black mess on the raw inside of the hoof. I made a fairly wet slurry and gave that foot a good sousing. I remember saying "If it cures this it will be a miracle". That was one Sunday, the next Sunday that foot was dried up except for a slight

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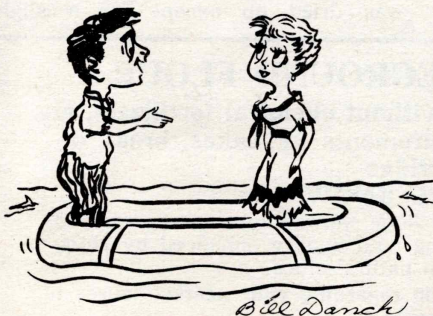
IVAN G. HISLOP, R.D.2, Kaikoura.

juicing at the tip of one toe.

This experiment had been shaping so well that I had to do some more. A friend who farms a mile or two away had been growling about foot-rot, so I asked him to let me try my hand. I took some of my earth, adding a little Harry Leaman Municipal Compost for luck. There were not so many ewes affected, but we did six, some bad, putting them into a clean paddock with some pigs and cattle. A fortnight later I was rung up: "You're on a miracle, boy, they've all dried up!" My friend tells me that months later, in February '63 he dressed three ewes with some of that same earth.

I called this an experiment, which term may make the average scientist snort, especially as I added Compost "for luck". To produce results acceptable to the scientific mind it would be necessary to isolate each species of bacteria, each fungus, the protozoa, and all the other microscopic types in that earth, trying each one against the isolated foot-rot organisms.

Well, fortunately I'm only a farmer, and what I did looks as if it works and can do no possible damage. What seems to me to be indicated is that if the soil is in good enough condition foot-rot will hardly appear; on the other hand, if it appears and cannot be cured by similar treatment, perhaps the soil is not in good health.



"What luck! I'm an organic farmer, too!"

BOOK REVIEW:

Fertilisation and grazing of lucerne

"THE LUCERNE CROP" — Editor, Professor R. H. M. Langer. \$4.50. (A. H. & A. W. Reed.) Our copy by courtesy of the publishers.

"The Lucerne Crop" is a book for the agricultural scientist rather than the farmer. It takes the form of a series of lectures delivered at a Lincoln College Symposium in 1967, and notes on the discussion which followed the various papers are included.

The book contains a vast amount of technical and specialised knowledge on the lucerne plant. It deals with plant breeding, the growth and development of lucerne, its response to climate, soils and other factors. The fertilisation and grazing management of lucerne is discussed, and also its value as an animal feed in terms of nutrition and live weight gains.

Importance of Sulphur

The book is entirely orthodox in its approach to weed, disease and insect control, although it records that concern was expressed regarding the effect of systemic insecticides on pollinating insects. On the subject of fertilisers it was interesting to note the importance of sulphur on lucerne yields, and the success associated with its use in the form of gypsum especially in low rainfall areas.

A book such as this impresses the reader with the vast amount of research which is being done on pasture species of economic importance. In bringing together much valuable information about lucerne cultivation in temperate climates it will be an invaluable reference work for agricultural students and farm advisors.

—M.S.C.

Organic Farming on Gum Country

Farming in the gum country of Northland poses some particular problems and in this article the farmer who has changed over to Organic methods describes how he set about rebuilding soil fertility and animal health.

Previously farmed by orthodox methods the land was top dressed with serpentine super at the rate of 3 cwt. to the acre and with half a ton of lime to the acre every second year, in 1957 this was changed to basic slag and since then no artificials have been used.

Mr Buchanan said he first of all experimented in the vegetable garden and in the orchard and being delighted with the results decided to apply the Organic method to the whole farm. He had been carrying 85 dairy cows and 40 dry stock, at the time of the switch over the dairy cows were reduced to 65 and the dry stock to 20 with some pigs and laying hens.

New pastures have been laid down during the last 20 years and sown with a certified mixture of rye grass, perennial and white clover and cow grass, the area in grass was divided into 35 paddocks, the dairy cows being rotated round 32 of these, the rest and an area of native bush and titree was used for the dry stock. Paspalum, plantain, rib grass, trefoil and lotus angustissimus now dominated, and in some areas native grasses and crested dogstail became very prominent. After four seasons it became evident that the effects of artificial top dressing had gone and growth seemed at a standstill. During the transition stage it became impossible to make ensilage and hay was of very poor quality as the grasses were very fibrous. It became necessary to buy in hay and as the cattle were showing mineral deficiencies a lick was provided.

The land now being farmed by Mr Buchanan was overgrown with Kauri trees some 500 years ago. This left the land very acid and in places there is a hard pan close to the surface over a clay sub-soil of sticky formation. Small titree grows, the soil is stiff to work and after the first working many hard lumps remained although weathering and liming helped to break them up in time. Thirty years ago farmers avoided using this land but with deep ploughing, heavy liming and using chemical manures as a boost Mr Buchanan managed to get a good grass strike. Potash and other chemical fertilisers increased the carrying capacity substantially as did the animal droppings. On a farm of 236 acres, Mr Buchanan has some 150 acres sown down in grass, the rest consists of titree and native grasses except for six acres now growing paspalum and native grasses amongst which can still be seen stumps of Kauri trees.

In the fifth and sixth seasons white clover which had disappeared began to reappear as well as lotus major and rye grass especially in the night paddocks. It was now evident that the soil micro-organisms had readjusted themselves and were working more efficiently, earthworms became more plentiful.

Today, three years later, a large area of the farm carries about 50 per cent. clovers and topping with the

mower is now becoming necessary. However rushes and buttercup which generally spread rapidly in this type of country are not much trouble with the Organic way.

To aerate the soil, I gave the whole grassed area where the tractor would go as well as native grasses amongst the titree, two or more strokes with the Bevin agricultural harrow, this was in 1961—I had previously used the old type Bevin over part of the farm as the 1958-59 season was too wet to do any harrowing. Since then some paddocks have been done every year.

One pig paddock in particular that had considerable accumulation of humus was given several strokes with these harrows, has never looked back and carries excellent sward of ryeclover although no previous cultivation has been done. However, on the rest of the farm a chisel plough has been used for the last three years going two inches deeper every year and has proved its worth especially on low-lying wet areas and where obstructions lie underneath the ground.

Now it became evident at one stage after the effect of slag and artificials had gone that ensilage making was out of the question and hay was of too poor a quality to make as the grass was too fibrous. However at present fair quality leafy hay can be cut from my own paddocks and stock are in fair to good condition and their health is gradually improving, sows with litters are much better and the eggs from our small flock of hens are in keen demand.

To winter the stock about one-seventh of the grassed area is shut up before Christmas, more areas being added later when feed is plentiful as well as five acres of stacked hay. This grass is breakfed through the winter and hay fed out after it is finished. Each paddock is chain-harrowed after grazing and the chisel plough is used later when the ground is suitable, usually the springtime; this treatment improves the sward enormously, worms can usually be found accumulating in furrows made by the chisel plough.

These last few years a hundred acres of the farm have had light sowings of grass seed by hand including deep rooting clovers and rye grass and some chicory, this is done after the Bevin harrowing or the chisel ploughing.

Every night and morning after milking the cow manure is collected and put in layers with green vegetation, sawdust and earth and lime and left to turn into Compost, also some horse and hen manure is added, also comfrey leaves. It is aerated by making holes in it and turned, and after twelve months is carted out to the day paddocks and spread at about ten tons to the acre.

The cows are milked at half-past six in the morning and at half-past six at night which gives them longer in the day paddocks than is usual to even up the distribution of manure on the farm. The cows are allowed to stand about five minutes before being turned into a race or roadway to go to the shed. Hens are allowed on Compost heaps to scratch for worms and sometimes pigs and the heaps are later rebuilt.

After Organic farming for ten years more effort and plans are being made to improve production; to this end 50 sheep are being rotated round the cow paddocks with the use of the electric fences and cultivation with the chisel plough when the ground is suitable.

Sixty acres of titree has been chopped by contractors with rotary mowers and boundary fences improved to hold sheep. The titree is being left and not burnt as is the usual practice but being left to turn into humus instead. A light sowing of grass will be sown to supplement native grasses already growing including deep-rooting varieties. This will be followed later by lime at half a ton per acre and slag at 3 cwt. per acre sown by air. A number of Polled Angus beef cattle will be purchased to fatten and crush fern and titree growing with the grasses.

Defeating the Grass Grub

One of the problems faced by farmers today is the ravaging of pastures by grass grub; the damage can be considerable and unfortunately the remedy is to apply DDT. Organic farmers have a different way of dealing with this problem and in the following article a member gives details of his system.

As far as I am concerned, neither of the grass grubs bother me much. Mainly this is because I use practically no rye grass. It appears to me that the grubs agree with me that perennial rye would be better if it were only a memory, but unfortunately they are a bit hard on red and white clover also.

The only anti-grub action I take is in the autumn. I sow lucerne and grass mixtures in late January and often grub damage appears in March. I have followed the same practice for years but this is the first time that I have been quite sure that treatment really was effective, so I will give dates and details.

I sowed lucerne on 24th January. On the 3rd March I noticed several patches where the grub was showing. On the 5th, two of us had a good look. A few square yards were practically killed, but several big patches, say half a chain square each, were showing a big percentage of wilted and dying plants, both weeds and lucerne.

I brought the ewes and tramped all the affected parts, also patches where nettles were becoming aggressive. There were 20 points of rain on the night of the 8th and on the 9th the ewes did another stint, over the same area; also all the west end of the paddock. The east end had had Municipal Compost the year before so needed no tramping, neither for grub nor weeds.

When tramping the sheep are kept in a fairly tight mob. About a week later the affected patches were heal-

ing and were not easy to find when we searched for them in May.

The reasons would appear to be:

- (a)—The tramping kills or immobilises the grubs
- (b)—The firming of the ground enables the damaged plants to root again
- (c)—the tramping (firming) helps the lucerne and discourages weeds.

What I am sure of is that this technique works, but whether it would work elsewhere or at a different time of year I do not know.

Last year a great many porina grubs were killed on this farm by a parasitic fungus and by another ill which may be a virus.

* * *

Here is a ley mixture recommended by Mr Nicolls:

Inoculated Lucerne 8-10lbs.

Timothy 1-1½lbs.

Phalaris Tuberosa 1-1½lbs.

Plantain (Rib Grass) ½-1lb.

White Clover 3-4oz.

This is a slow mixture to start and only a small quantity of clover is sown in order to prevent the clover dominating the sward. The primary aim is to obtain a stand of lucerne with enough of the other ingredients to fill in afterwards.

The effects of super on pasture are illustrated by this report from Wairarapa. It appears that a plane loaded with super for top-dressing crashed on a hill pasture, with the result that the surrounding area received super at the rate of about a ton to the acre. The first effect was almost magical; a dense mass of volunteer clover (presumably white) sprang up, on which the sheep practically lived. But in the following year the grass grub took over to such an extent that this particular area was reduced to bare earth. The severity of the attack lessened towards its outskirts, where there had been less super.

Dairy wastes returned to pastures

Simple sprinkler systems which utilise farm waste as fertiliser, and at the same time avoid the pollution of streams, are being installed in growing numbers on Bay of Plenty dairy farms.

Most systems have been installed to avoid pollution, rather than conserve fertility, but some farmers have gone ahead purely from the fertility angle.

Though it is too soon to assess results, farmers who have had more than a year's experience with waste disposal systems believe they are getting value for their investment.

There have been claims that growth has improved on treated pastures, drought effect has been minimised, and hygiene round cowsheds has improved.

One farmer has reported grass grub numbers appear to be noticeably less on pastures sprayed with cowyard wastes.

No Bloat

From Opotiki comes the report that no bloat has been recorded for six years in a dairy herd grazing on land sprayed with dairy factory wastes, yet the same cows can bloat in a few hours on unsprayed pastures adjoining the company farm.

Whether or not the benefits can be proved scientifically, today's comparatively few users of farm wastes are certain to grow to many as the provisions of the new river pollution laws are enforced.

Many of the farmers will be required to cease discharging effluent, and treat it in a septic tank system, or spread it safely as a farm manure over pastures.

The sprinkler system is regarded as the most economic because it gives a return in the form of improved pasture for less expenditure on chemical fertiliser.

Among the farmers with a conservation approach to farm wastes are Tauranga dairyfarmers, Field and Mona Candy, who have installed a sprinkler disposal system on their 217-acre farm at Ohauiti.

The Candys, a hard-working man-and-wife team developing a rather steep dairy farm, have introduced a system to utilise dairy and pig shed wastes which once ran to the sea via the Kirikiri Stream.

Pump

A sewage pump takes effluent to the paddocks from a 1500 gallon sump fed by drainage from cowshed and pig sty.

The simple system, installed for about \$400, already shows signs of benefit after 18 months' operation.

Sixteen hundred feet of 1½ in. alka-thene hose is connected to an ordinary portable revolving irrigation sprinkler, which is moved daily round the paddocks.

The pump runs for about one hour each day to spray 600 gallons of effluent, and is then shifted to a new site ready for the next day's operation.

"The amount of waste is fantastic," Field says. "We only wish the farm was a bit flatter so that we could reach all our paddocks with the sprinkler."

One steep area which grew nothing but rats' tail and moss, now grows good rye-clover-paspalum pasture.

"It was practically useless for cows before we started treatment," says Field.

About 30 acres of the farm have so far been given varying amounts of Organic waste manure.

The Candys milk 111 cows on the farm. Milk is separated, and the skim

fed to about 100 pigs. (Twelve breeding sows are kept.)

They believe grassgrubs are much less trouble in the Organically-fed pastures than on untreated pastures.

"You can hardly find any grassgrubs in the treated paddocks, though they are present elsewhere," they say.

As an added "insurance" they have installed starling breeding nests round the farm. These are specially built nesting "flats" with a circular entrance too small to allow a minah to enter and destroy the eggs or young starlings.

Undoubtedly the most dramatic effect of waste disposal on farms has been reported from the Opotiki Dairy Association's experimental farm.

No bloat has been recorded in the 110-cow herd while they were grazed

on the 65 acres sprayed regularly with a 50/50 mixture of whey and wash-water, at the rate of 7000 gallons an acre a fortnight.

Yet the cows have bloated quickly when moved to untreated pastures near the factory, sited in a bad bloat district.

Though no chemical fertilisers and no D.D.T. has been used on the farm, fertility is regarded as "fantastic" by the management, with a production increase from 12,000 to 30,000lb. butterfat in five years.

Though the average farmer cannot hope to achieve "miracles," many simple problems of shed hygiene and pasture fouling can be solved with a waste disposal system which can at the same time improve fertility.



—"Rotorua Post" photo.

A sprinkler head sprays a jet of cow and pig shed waste on pasture of the Candy farm, Ohauiti. This covers a circle of 40 feet across.

Weeds and Good Husbandry

F. Newman Turner, now deceased, was one of England's best Organic farmers and was the author of *Fertility Farming*, *Fertility Pastures and Herdmanship*, all published by Fabers. For many years he edited *The Farmer and the Gardener*, and *Fitness*. He formerly farmed in Somerset and Dorset.

There is not a plant growing on our farms, whether we call it a weed or a food crop, which does not have some purpose in the natural order. A weed is simply a plant growing where we have not yet discovered its purpose. Were we able to know the properties of all herbs (which is a more constructive description of these misunderstood plants) it might be realised that man is far more damaging to the soil than any "weed".

In my "Consult-the-Cow" experiments I discovered that it was the plants least available commercially, because spurned as useless by men who got their answers from the laboratory, not the cow, which were most popular with the cow herself! It is time that she and all the other

domestic animals in turn were asked again in scientifically laid out and statistically controlled experiments.

My own simple questions were given only simple and unscientific answers by my organically reared cows. Other, more complicated, questions need to be asked of other, more exploited, cows!

In 1952 I laid down thirty-five individual plots, each sown with a single ingredient of the herbal ley; namely:

- Chicory
- Yarrow
- Burnet
- Sheep's Parsley
- Kidney Vetch
- Ribgrass or Long-leaved Plantain
(*Plantago lanceolata*)
- Sainfoin
- Crimson Clover
- Broad Red Clover
- Alsike
- Italian Branching Clover
- Ladino Clover
- S.100 White Clover
- Late-flowering Red Clover
- Du Puits Lucerne (Alfalfa)
- Provence Lucerne (Alfalfa)
- Rough-Stalked Meadow Grass
- Smooth-Stalked Meadow Grass



A close-up of a fertility pasture showing yarrow and plantain among the clovers and grasses.

American Sweet Clover
 Cocksfoot, S.26
 Cocksfoot, S.143
 Cocksfoot, Akaroa
 Timothy, S.50
 Timothy, S.51
 Timothy, S.48
 Perennial Ryegrass, S.23
 Perennial Ryegrass, S.24
 Perennial Ryegrass, S.101
 H.1 Strain New Zealand
 Short Rotation Ryegrass
 Italian Ryegrass
 Westerwolths Ryegrass
 Meadow Fescue
 Tall Fescue
 Hard Fescue

The plots were divided from one another with strips of Chicory, which clearly distinguished each plot from the next. My object was to observe, first of all, growing habits of different species, and which of several strains of the various grasses were best suited to my conditions; and so to be able to work out the best mixtures for varying soil conditions, and for different requirements such as grazing at different times of the year.

But above all I wanted to know which of these pasture ingredients my cattle LIKED best, and what the order of preference was for the rest, so that I could adjust my mixtures according to the answers they gave.

These soon demonstrated the wastefulness and inefficiency of plan-

BOOKS FOR ORGANIC FARMERS

The following books (published by Crosby Lockwood) are of utmost interest to Organic Farmers and any farmers contemplating changing to such methods:

"Better Grassland Sward" (1960).

"Grass Productivity" (1959).

"Rational Grazing" (1962).

"Soil, Grass and Cancer" (1959).

Also recommended:

"The Keyline Plan"—P. A. Yeomans.

"The Challenge of Landscape"—P. A. Yeomans.

"The Geographical Basis of Keyline"—Prof. J. Macdonald Holmes.

ning the ley without consulting the cow. I found, for instance, that on my soil the cows did not touch Hard Fescue. It was completely ignored by them whenever there was anything else to graze.

The plots were laid down side-by-side consecutively alongside a roadway from which the cows could be controlled by fence—either to graze from the road through the fence without walking freely over the plots, or to be permitted free range over them.

Of the thirty-five plots, three were persistently eaten down while the rest were merely nibbled at; the herd would queue up to get to these three plots and each eat as much as they could before they were moved on. The plots preferred were Sheep's Parsley, Plantain and Chicory, all of doubtful repute in orthodox ley farming.

The ryegrass (*Lolium* species), meadow grasses (*Poas*) and Hard Fescue were almost untouched—Meadow Fescue and Tall Fescue were sampled. Timothy and Cocksfoot were grazed lightly, as were all the Clovers equally. The Lucernes were untouched, as was the American Sweet Clover. Following closely behind the three favourites, in this order, were: Burnet, Kidney Vetch, Sainfoin and Alsike. (The Italian Branching Clover from seed directly imported failed, but I have since obtained more seed from Italian friends and found it to be palatable and productive, though rather shy of a hard winter.)

Sampling through the fence provided the above information.

Later, when all plots were well established, the cows were turned in over all the plots at once. Their preferences continued to be the same: Sheep's Parsley was grazed down hard before any of the others, and Plantain and Chicory were not more than a day behind. The fact that Plantain and Chicory had a much heavier crop, both thicker and longer growth (for they had established much more completely), probably puts them at least level with Sheep's Parsley for preference.

The tendency to destroy all weeds indiscriminately, especially by means of poison sprays, is a policy of despair now that the buckrake and green crop loader have made silage-making—a sure method of controlling weeds—so easy. Good husbandry surely demands a more intelligent study of the utilization and control of these sources of fertility and health.

Using Weeds for Fertility Building

I have had some grand opportunities to demonstrate how weeds may be used for restoring organic topsoil fertility and at the same time cleaning dirty land. Indeed, I made a virtue out of the fact that my last farm was in a very weedy state as well as low in fertility when I took it over. I used the weeds to build fertility, and in the same process clean each field. Here is the method I evolved.

When a dirty field is to be re-seeded, or cropped in any way, I first give it a weed-mulch fallow. If it is friable enough to work up enough soil with the disc harrow or rotary hoe only, I churn up the whole field with either or both. On some occasions I have preceded the discs with a cultivator. But if the ground is hard, and all the weeds cannot effectively be cut without the plough, then the whole field will have to be ploughed just once; but not more than five inches deep—just enough to cut all weed roots and turn them over. Then all subsequent cultivations, throughout a full summer fallow, are done with the disc harrow or rotavator.

Instead of repeated ploughing to prevent any further weed growth from developing, I allow the weeds to grow up to the flowering stage, by which time they have produced their maximum bulk; then I use them as a green manure, discing them thoroughly into the top soil. The contribution which a disced-in weed crop makes to soil fertility is beyond all chemical analysis.

After the first weeds are disced in, the field is left untouched for about a month or six weeks. The weeds again grow up to produce a further substantial green-manure crop, which is again disced in before any seed is set. These operations are repeated several times, resulting in a large tonnage of organic matter being added to soil. A further result is the destruction of all weeds in the top few inches of soil—for what is missed in one discing is caught in the next; and each time that the field rests and further growth is allowed, more ungerminated weed seeds germinate and grow, and are disced into the soil before they can establish. But the field is never ploughed again before being sown. This would only bring up dormant weed seeds and put the now clean humus-rich topsoil down to the level where anaerobic conditions operate, making it quite useless to the crop that is to be sown.

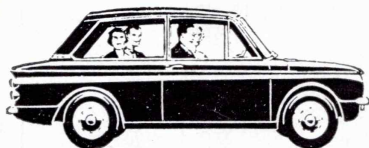
If left unturned, with the destroyed weeds incorporated with the topsoil, the soil begins to emulate hedgerow conditions. The decaying weeds release organic acids in the process of decay, and the acids in turn dissolve the essential minerals which are nearly always present in every type of soil—but not always available or soluble until the acids of decaying organic matter make them so. At the same time, aerobic bacteria gather nitrogen from the air to supplement the nitrogen directly supplied by the crop of green weeds. Thus, instead of dissolving the weeds in a deadly spray, the consequences of which we cannot measure in destruction of ultimate fertility and human life, we have used the weeds to gain vast quantities of organic manure, and, in the process, left the field virtually weed-free.

If it is felt that the field needs further cleaning, the first crop sown is a silage crop, which can be followed with a further short repeat of the weed-mulch fallow in the month or two after it is sown for silage in its green state.—Reproduced from "MOTHER EARTH".

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